ARCHAEOLOGICAL SITE TESTING ACTIVITIES AT 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON

by

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Abstract

A small scale test excavation of the archaeological site 45CA400 demonstrates that this is an important cultural resource that appears to be eligible for listing with the National Register of Historic Places. The portion of the site that we tested has at least eleven major cultural strata representing three distinct cultural components. The earlier prehistoric component - - represented by at least 10 of the lower strata - - contains evidence of cultural activities that occurred prior to approximately 2,900 years B. P. and began sometime between 3,200 and 3,800 years B. P. The earlier prehistoric component is represented by shell midden deposits that are rich in marine shell, fish, bird, and mammal bones, charcoal, fire-cracked rocks, and artifacts of stone, bone, and shell. Seasonal indicators suggest multi-season, or possibly even year round, occupation. The later prehistoric component at 45CA400 began sometime around, or after, 2,900 years ago. We are uncertain of its duration, but think it unlikely that it extended into the relatively recent past. The later prehistoric component is represented by the uppermost cultural stratum, a deposit that is rich in chipped stone but contains only very limited quantities of bone and shell. Finally, the uppermost cultural stratum also contains historic materials that appear to date to the early or mid 20th Century. The location of this site, its contents, and its antiquity all argue that the earlier prehistoric component may be associated with a previous, higher than modern, sea level stand. Thus, 45CA400 may also contain important information about sea level history, environmental change, and their effects on the prehistoric Makah People.

The cover picture is a view of the lower Wa'atch River Valley and the Pacific Ocean beyond it. The 45CA400 site area is located along the southern valley wall near the center of this image; its approximate location is indicated by a small blue dot. The view is to the west.

Acknowledgments

The program of studies undertaken at 45CA400 has benefited from the support and assistance of many people. First, we acknowledge the support of Makah Tribal Historic Preservation Officer Janine Bowechop and the Makah Cultural and Research Center's Board of Trustees. The effort received considerable encouragement, material support, and financial assistance from Bob Steelquist and the Olympic Coast National Marine Sanctuary. Rebekah Monette and Glenn Johnson of the Makah Tribal Historic Preservation Office assisted the effort in numerous practical ways before, during, and after the fieldwork. David Huelsbeck of Pacific Lutheran University and Jeff Mauger of Peninsula College played important roles in arranging their institution's participation in the field school and were important players during the work. Olympic National Park archaeologists Dave Conca and Kim Kwarsick helped investigate the site area prior to the field school. David Herda of the Tribe's Real Estate Department assisted in recording the site's location. Chet Knaus allowed us to use his property to access the site area.

The field crew included: Pacific Lutheran University students Catherine Beard, Sang Han, Jeff Horton, Nicole Holmes, Stefanie Midlock, John Rowell, and Justin Sobania, Peninsula College students Pete Steelquist, Gail Roemer, Raena Young, and Sherri Anderson, Rebekah Monette, Glenn Johnson, Bob Steelquist, and Phoebe Anderson.

Much of the post-fieldwork analysis for this study was conducted by students from Pacific Lutheran University. David Huelsbeck oversaw Stefanie Midlock's analysis of the 1/4 inch mesh fish bone samples and Jeni Morris' analysis of the mammal bone samples. Huelsbeck also conducted the analysis of the 1/8 inch mesh fish bone samples. Gary Wessen and Huelsbeck oversaw Jeff Horton's analysis of the chipped stone debitage. Wessen also designed and conducted the analysis of shellfish remains with considerable assistance from Pacific Lutheran University's Anthropology Club. The bird bones were identified Rebecca Wigen of Pacific Identifications. All other analyses and interpretations in this report are the work of the author.

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Last, but not least, we would like to acknowledge the contribution of Paul Parker who noticed this site, correctly understood what it was, and alerted the Makah Cultural and Research Center. Without Paul, we wouldn't even know that the site was there.

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1.0 INTRODUCTION

In the summer of 2001, the Makah Tribal Historic Preservation Office (THPO) began its program of site evaluations. The principal focus of these evaluations is to determine which sites on the Makah Indian Reservation appear to be eligible for listing with the National Register of Historic Places. Within this context, we have chosen to initially focus upon potentially older sites on the reservation. Most of the previously sampled sites on the Makah Indian Reservation are relatively recent late prehistoric occupations and we hoped to use the site evaluation program as an opportunity to learn about the earlier history of the Makah People.

In the spring of 2005, the site 45CA400 was selected for study. This is a multi-component prehistoric site thought to be associated with an earlier sea level stand. It is the third site to be investigated by the Makah THPO program. In some contrast to the earlier efforts, the 45CA400 study was a collaborative effort in which Makah THPO staff teamed with students and faculty from Pacific Lutheran University and Peninsula College, and with the Olympic Coast National Marine Sanctuary (OCNMS). A test excavation was undertaken in late June and early July of that year and subsequent study of the materials collected from it supports the view that it is eligible for listing with the National Register of Historic Places.

This report describes the background, methods, activities, and findings of that effort. Field notes, photographs, and other analytical documentation from this study are on file with the Makah Cultural and Research Center (MCRC) in Neah Bay.

2.0 BACKGROUND

The following sections offer brief accounts of various aspects of the background context of the present study of 45CA400. In broad terms, they provide accounts of the study area, and its environmental, cultural, and archaeological settings.

2.1 The Study Area

The 45CA400 Study Area is located on the Makah Indian Reservation, Washington (see Figure 1). It is located along the edge of the Wa'atch River floodplain, in the northern portion of the reservation. Specifically, it is located in the southwest quarter of Section 15, Township 33 North, Range 15 West. The site area is atop a terrace which forms a portion of the southern margin of the floodplain (see Figure 2). Its elevation is approximately 40 feet above sea level. At this time, the closest portion of the Wa'atch River channel is located approximately 0.25 mile to the northwest; this stretch of river is at approximately river mile 2.4. The closest marine beaches are at Neah Bay, along the Strait of Juan de Fuca, approximately 1.2 mile to the northeast. The closest Pacific Ocean beaches, at the mouth of the Wa'atch River on Makah Bay, are located approximately 2.3 miles to the west. A small unnamed creek crosses the terrace at the western end of the site. The site area is currently undeveloped second-growth forest land. The understory in this area is very thick and it is marked by numerous blown-down trees. The ground surface here has many hummocks and depressions that are thought to represent historic logging activities.

2.2 Environmental Setting

The following discussions of the environmental setting of the 45CA400 study area will briefly consider both its modern environment and its environmental history. Of these, the modern environment is addressed in greater detail because it is better understood. The Holocene environmental history of the northwestern Olympic Peninsula is important to understanding the materials at this site - - and the cultural behaviors they represent - - but our knowledge of the details of this history is very limited.

2.2.1 The Modern Environment

Relevant aspects of the modern environmental setting of the 45CA400 study area include its climate, geology, soils, flora, and fauna. As some of these conditions are regional in scope, this review will place the study area within the context of the environmental setting of the northwestern Olympic Peninsula.

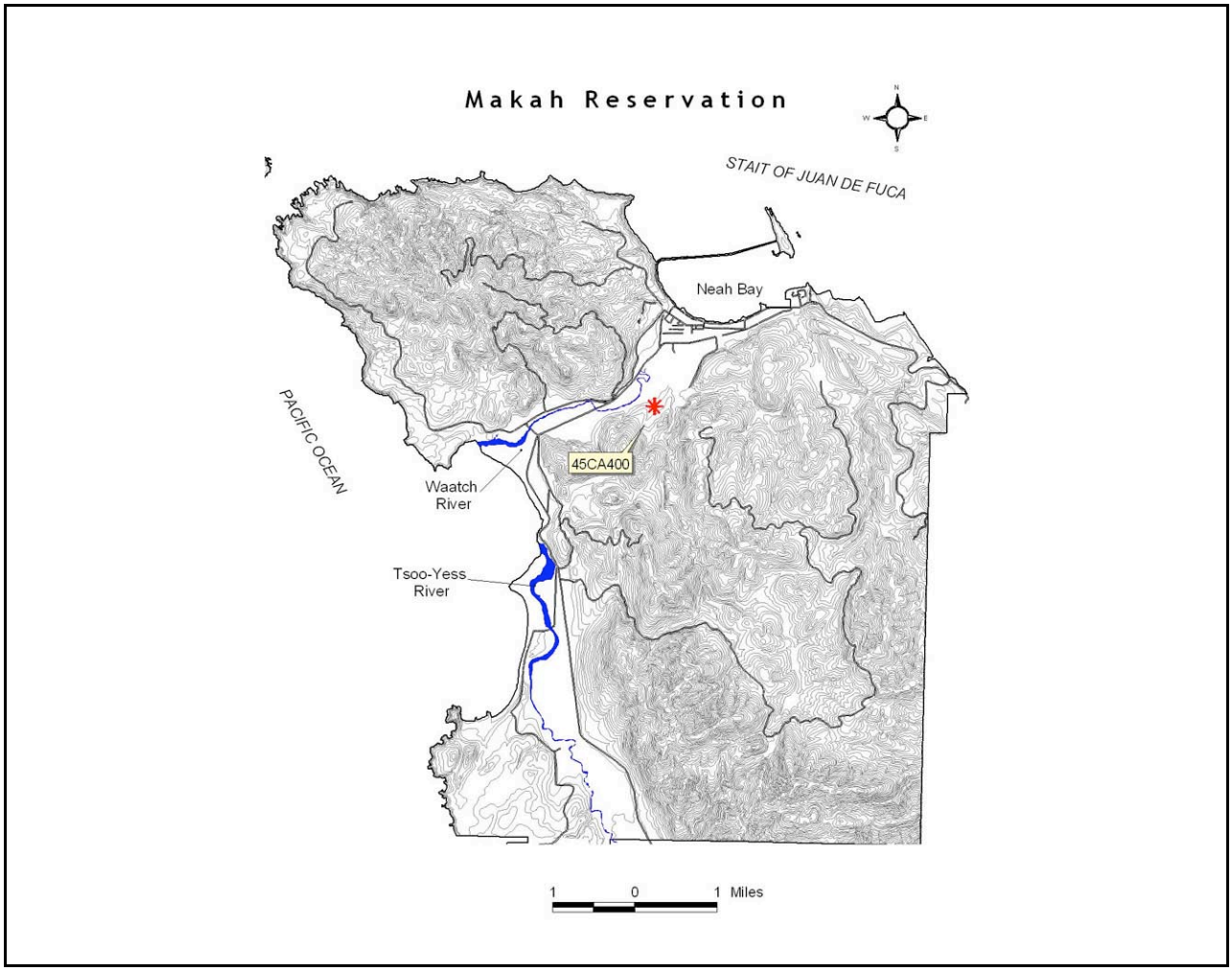

Figure 1 The location of 45CA400, Makah Indian Reservation, Washington.

Figure 2 The 45CA400 site area, Makah Indian Reservation, Washington. The site is located along the top of the terrace on the right side of this image. View is to the northeast.

The climate of the northwestern Olympic Peninsula region is best described as a mid-latitude maritime climate. It is characterized by mild temperatures and high precipitation; the typical pattern is heavy winter precipitation and relatively cool, dry summers. The principal factors shaping this pattern are the peninsula's rugged relief and a moist southwesterly air flow off the Pacific Ocean. Near the coast and at low elevation, temperatures are mild and seasonal extremes are not pronounced. At higher elevations the low temperature extremes become greater, and year-round variation is increased. Precipitation is also affected by elevation. Precipitation totals increase with elevation. At lower levels precipitation is almost exclusively rain; at higher elevations snowfall becomes increasingly dominant.

Local weather conditions for the study area have been recorded at Tatoosh Island, approximately 7 miles to the northwest (Phillips and Donaldson 1972). This station reports a mean annual temperature of 50 degrees (F); a monthly mean low of 42 degrees in January and a

monthly mean high of 54 degrees in July and August. Precipitation at Tatoosh Island has an annual mean of 99.16 inches, almost all of which falls as rain. The monthly mean low is 2.03 inches in August; the monthly mean high is 16.43 inches in December.

From a geological point of view, the 45CA400 study area lies at the margin of the major regional geologic units on the Olympic Peninsula (Tabor 1975). The area lies along the Wa'atch River valley, between Neah Bay and the Pacific Ocean beaches at Makah Bay. The vicinity of the study area is mantled by a thick layer of loams, sands, and gravels. These sediments represent glacial materials. Underlying these surface deposits are a complex of sedimentary rock strata consisting largely of Middle and Upper Eocene (i.e., ca. 40 to 50 million year old) sandstones and siltstones (Muller, Snavely, and Tabor 1983). The landform containing the site has been described as a glacial modified terrace by McMurphy (1974). McMurphy does not suggest the mechanism responsible for the terrace's formation, but we suspect that it is an old marine terrace associated with a higher than modern sea level stand (see Section 2.2.2). The Makah Indian Reservation has not been subject to a formal USDA soil survey, but it is likely that soils in the vicinity of the site area are consistent with those of the Queets-Tealwhit Association (Hallion 1987). These soils are common to flood plain and low terrace settings on the northwestern tip of the Olympic Peninsula.

Vegetation is one of the most spectacular aspects of the Olympic region. On the regional level, the study area lies within what Jones (1936) referred to as the Spruce-Cedar Climax of his Humid Transition Zone. Later, Franklin and Dyrness (1972) placed this area within their *Tsuga heterophylla* Zone. While the names used by these researchers are different, the characteristics of their vegetation units share many features. Typical to this setting, the flora of the immediate vicinity of the 45CA400 study area is dominated by trees such as western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and Sitka spruce (*Picea sitchensis*). Prominent understory plants here include salal (*Gaultheria shallon*), sword fern (*Polystichtum munitum*), salmonberry (*Rubus spectablis*) and oceanspray (*Holodiscus discolor*).

The immediate vicinity of the 45CA400 study area probably hosted most, if not all, of the fauna common to protected outer coast shoreline areas of the Olympic Peninsula. This suite of wildlife includes a wide range of mammals, birds, marine and anadromous fish, and shellfish.

Mammals which could occur in the vicinity of the study area include both large game and a wide variety of smaller animals. The most conspicuous large game which might move through here were probably deer (*Odocoileus hemionus*) and black bear (*Ursus americanus*). Smaller terrestrial mammals common in the area included the raccoon (*Procyon lotor*), beaver (*Castor canadensis*), and river otter (*Lutra canadensis*). The nearshore marine waters contain harbor seals (*Phoca vitulina*); harbor porpoise (*Phocoena phocoena*) and/or Dall Porpoise (*Phocoenoides dalli*) may also occasionally visit the area. Further offshore, certain seasons bring large numbers of gray whales (*Eochrichtius gibbosus*) and fur seals (*Callorhinus ursinus*).

This area supports a wide range of birds including both year round residents and those present only on a seasonal basis. Further, given its lowland nearshore setting, both interior and shoreline birds are common here. Common interior birds include the raven (*Corvus corax*), blue grouse (*Dendragapus obscurus*), and the winter wren (*Troglydtes troglydtes*). Shoreline birds include the kingfisher (*Megaceryle alcyon*), great blue heron (*Ardea herodias*), and various ducks (*Anas* spp.) and geese (*Banta* spp.).

Marine and anadromous fish in the area probably include most forms typical to marine waters throughout western Washington. Most species of salmon (*Oncorhynchus* spp.) are present as they pass to the spawning grounds in the area and further to the east. Other prominent fishes in the nearshore waters include dogfish (*Squalus acanthias*), lingcod (*Ophidon elongatus*), herring (*Clupea hareengus*), and several varieties of rockfish *(Sebates* spp.), sea perch (Embiotocidae), and sculpin (Cottidae).

The marine invertebrate population on nearby marine beaches is that common to most of the northwestern Olympic Peninsula. Important bivalves in the area include the California mussel (*Mytilus Califorianus*) on rocky shores. Steamer clams (*Protothaca staminea*), butter clams (*Saxidomus giganteus*), and basket cockles (*Clinocardium nuttalli*) can be found where gravelly or sandy substrates are present. Common gastropods here include several varieties of limpets (*Acamea* spp.) and dogwhinkles (*Thias* spp.). In addition, nearshore rocks support large numbers of chitons (*Katharina tunicata*) and several species of barnacles (*Balanus* spp.).

2.2.2 Past Environments

While the issue of most direct relevance to this study is sea level history during the second half of the Holocene, relatively little is known about this subject. As such, this account will first offer a very brief discussion of the Late Pleistocene and Holocene and consider what can be said about local sea level history.

The northwestern tip of the Olympic Peninsula - - including the entire Makah Indian Reservation - - were covered by the Juan de Fuca Lobe of the Cordilleran Glacial Ice Sheet in Late Pleistocene times (Armstrong et al. 1965). This ice probably moved into the northwestern tip of the Olympic Peninsula sometime around 24,000 years ago and was gone by 12,000 to 14,000 years ago. The area around Cape Flattery probably did not supported local alpine glaciation and so glacial effects cease to be a factor after the retreat of the Cordilleran ice.

While it is likely that newly deglaciated surfaces had a periglacial character, pollen data suggests that some shrubs and herbs established themselves relatively quickly (Heusser 1973, 1974, and 1977; Petersen et al. 1983; Gavin et al. 2001). Lodgepole pine (*Pinus contorta*) may have been the first tree to appear after the ice was gone. Ameliorating weather conditions and developing soils allowed for an increasingly diverse flora in the area, and a number of additional types of trees are probably present by ca. 10,000 years ago. A Mid Holocene warm-dry interval

- - sometimes referred to as the Altithermal or Hypsithermal - - probably occurred between ca. 6,000 and 8,000 years ago, at which time trees like Douglas fir (*Pseudostuga menziesii*) and red alder (*Alnus rubra*) were common. Conditions began to cool somewhat after this time. The modern Spruce-Cedar dominated climax forest described above in Section 2.2.1 was probably not present until sometime between 3,000 and 5,000 years ago.

Sea level history is a particularly important aspect of the local environmental history for this study because we believe that the 45CA400 site area is associated with a sea level that pre-dates the modern condition. While sea levels are strongly influenced by worldwide conditions, sea levels in any particular coastal area are also effected by vertical movements of the ground that occur on local and regional scales. The combination of these factors is usually complex. On the western Olympic Peninsula, little data is available and the few available sea level reconstructions for the Late Pleistocene and Holocene contain important contradictions (Wessen 2003a). One major area of conflicting ideas is local sea levels prior to ca. 10,000 years ago. A model offered by Anderson et al. (1990) suggests that local sea levels prior to ca. 10,000 years ago were dramatically lower than at present. In contrast, however, another model offered by Schalk (1988), and data from a location near the west coast of nearby Vancouver Island (Friele 1991), suggests that local sea levels prior to ca. 10,000 years ago were much higher than at present. Resolution of this issue is important to understanding local sea level history, but conditions prior to ca. 10,000 years ago are not immediately relevant to the 45CA400 site area.

Local sea level conditions during the Mid and Late Holocene are immediately relevant to the 45CA400 site area. The available ideas about sea level for this period also contain important contradictions, but several of them (i.e., Schalk 1988, Friele 1991, and Hutchinson 1992) agree that there was a higher than modern sea level stand during the Mid and/or Late Holocene. The three sources cited here do not agree about the magnitude and the timing of the onset and duration of this high stand, but they all agree that a sea level on the order of 3 to 5 meters (10 to 16 feet) higher than at present did persist for at least several thousand years during the Mid and/or Late Holocene. A sea level stand in this range would have flooded much of what is now the lower Wa'atch River valley. Depending on its actual height, either a portion of this valley would have been a salt water bay - - an arm of the present Makah Bay - - or there could have been a relatively protected salt water channel linking the present Makah Bay with the present Neah Bay. In the second scenario, the Bahokus Peak massif - - including the Cape Flattery area - - would have been an island. While we cannot choose between a bay or a channel at this time, we are confident that at least a portion of the lower Wa'atch River valley was flooded with salt water during the Mid and/or Late Holocene and we believe that at least some of the 45CA400 occupation was associated with this salt water body.

2.3 Cultural Setting

The following discussions of cultural setting will briefly describe the historic, ethnographic, and archaeological background of the vicinity of 45CA400. As the study is predominately archaeological, discussion of the archaeological background is most extensive.

2.3.1 History

The earliest written history of the Makah Indian Reservation is essentially the history of Europeans, and later Euro-Americans, intruding upon the traditional life of the Makah people. This period is not well documented and it is recorded largely from the eyes of the intruders. The first European to have traveled in this area may have been the Greek navigator Juan de Fuca, who claimed to have passed this way in 1592. If so, there are no surviving accounts of him interacting with Makahs anywhere within their territory.

While other Europeans later sailed through the area, the first recorded to have landed here was Manual Qumiper (Hoonan 1964). A part of active Spanish explorations, he arrived in Neah Bay in July of 1790. Landing from the ship *Princesa Real*, Qumiper named the bay "Bahia de Nunez Gaona" and claimed the surrounding lands for Spain. In association with this act, he erected a wooden cross somewhere near the western end of Neah Bay (apparently in the general vicinity of Village Creek and the Makah community of Deah).

Two years later, in May of 1792, a small Spanish force under the command of Salvador Fidalgo returned to Neah Bay in order to establish a fort (Wagner 1933). Returning to the reported vicinity of Qumiper's wooden cross, he erected a stockade and a number of structures. While the specific size of the settlement is not known, it couldn't have been very large and there are conflicting accounts of its contents (Whitlam 1990). Reported contents include a forge, a blacksmith shop, a baking oven, and as many as ten cabins. Unfortunately, the Spanish proved to be poor neighbors and quickly got into difficulties with the local residents. After an altercation in early July which cost the lives of one Spaniard and perhaps a dozen or more Makahs, Fidalgo was made to feel unwelcome and, on September 26, 1792, the Spanish abandoned their fort and sailed away.

The following several decades saw increasing European and Euro-American traffic in this region, both as a part of the Spanish-English rivalry and as a part of the early 19th Century fur trade. Contact between Makahs and outsiders surely occurred during this period, but there are few specific records and no reason to believe that any such contacts were associated with a sustained presence of non-Makahs.

The next outsider to attempt to establish himself in the area was probably Samuel Hancock, a Euro-American fortune hunter who arrived in the fall of 1849 (Hancock 1927). Hancock apparently tried to established a trading post at Neah Bay, but his plan never really

materialized and he left the area the following spring. Hancock's settlement was located on the eastern end of the bay, but both the nature and the specific location of this occupation are unknown. Hancock returned to Neah Bay again in 1852, but his stay was even briefer this time.

In August of 1857, a second and more successful attempt to establish a trading post occurred (Washburn 1971). Henry Webster, William and Charles Winsor, and Charles Strong arrived in the Neah Bay area and built a compound at Baada Point in the general vicinity of Agency Creek and the Makah community of Biheda. When James Swan visited the area in 1859 he described it as including "...two dwelling houses, an oil house, a store house,....a fish house, a smoke house, and a cooperage." Shortly after its establishment, Webster bought out several of his partners interests and the post became known as 'Webster's Store'. Webster subsequently became the first Indian Agent in Neah Bay and this complex of structures became the core of the first sustained Euro-American presence in the Neah Bay study area. By 1865, the complex also contained the agent's house, a carpenter shop, and an Indian school. Additional structures came later and the Baada Point area was a center for Bureau of Indian Affairs (BIA) activities for more than a century.

Against this backdrop of early historic activities, it must be acknowledged that we have almost no information about the history of the immediate vicinity of the 45CA400 site area. This area is removed from any of the early historic centers of activity. We believe that the only significant historic activities here were related to timber harvesting. The first large-scale timber harvesting on the Makah Indian Reservation occurred in the late 1920s (Williams and Helin 1984). We do not know when the vicinity of 45CA400 was first logged, but we think that it was likely between the late 1920s and the second World War. The pace of logging slowed considerably during the war years and then resumed in 1946. The vicinity of 45CA400 is sufficiently remote that it was also unaffected by post-war developments on the reservation. The only other historic impact we are aware of is a second episode of timber harvesting that occurred in the site area in the 1970s.

2.3.2 Ethnography

The 45CA400 is situated within the traditional territory of the Makah Indians (Swan 1869, Ranker and Gunther 1990). The Makah people speak a Wakashan language closely related to the Nitinat and Nootkan languages spoken on Vancouver Island. In early historic times, the Makah were well known for their prowess in offshore fishing and marine mammal hunting. The historic settlements of these people were located along marine beaches in their territory. James Swan (1869:6) reported that they occupied five principal winter villages: "Deah" (often rendered "Neah") and "Biheda" located on Neah Bay, "Wa'atch" and "Tsoo-yess" located on Makah Bay, and "Osett" (often rendered "Ozette") located at Cape Alava.

The Makah had a traditional economy much like those of most of their Wakashan-speaking neighbors to the north. They were skilled fishermen, marine hunters, and plant material

gathers who possessed great knowledge about the resources available in their environment. While resources like whales, seals, salmon, and halibut can safely be considered to have been a major focus of their economic activities, they undoubtedly exploited a wide range of other fish, shellfish, mammal, bird, and plant food resources. Swan (ibid) reports that they followed a subsistence pattern characterized by a series of seasonal movements determined by the availability of different seasonal resources. A typical annual cycle of movements included a substantial winter village and one or more seasonal camps which supported such activities as plant or shellfish collecting, hunting, and fishing. Winter villages were marked by the presence of large plank longhouses; residential structures in the seasonal camps were usually relatively small pole frame lodges covered with brush or woven mats.

The material culture of the Makah people was very similar to that of their Wakashan-speaking neighbors. They were skilled craftsmen and technicians who produced a wide range of goods from plant, bone and stone materials. Like all southern Northwest Coast peoples, they were particularly noted for their skill with wood and other plant fibers. They worked extensively with western red cedar, using the wood to make the large plank longhouses, canoes, boxes and many smaller utilitarian items. Cedar bark and other plant fibers were used to make a wide variety of basketry, cordage, nets and clothing. Bone and stone objects represent a smaller, but important portion of the material culture as most cutting tools and ornaments were made of these materials.

The social and ceremonial life of the Makah people had much in common with that of the other Northwest Coast peoples. Although the term “tribe” has been associated with native groups in contemporary times, it may not be applicable to the pre-contact inhabitants of the area. Most types of economic, political and social affiliation appear to have focused upon local lineal (family) groups which were based in one or more winter villages. Family control of resource collection localities and ownership of the rights to ceremonial properties such as dances, songs, titles, and masks was the rule. Three broad categories of social standing existed within the local groups: nobles or upper class freemen, commoners or lower class freemen and slaves (usually captives taken from other groups). Marriage patterns tended toward local group exogamy with wives generally taking residence in their husband's group. Descent patterns tended to favor the father's group. Actual marriage patterns were variable, with the above noted norms being most important among the upper-class families. These relations created a broad network of social ties which supported a significant amount of regional economic and ceremonial exchange. While Makah social ties appear to have been most developed with the Wakashan groups of Vancouver Island, they also interacted with Salish and Chimakuan groups to their east and south.

There do not appear to be any historic or ethnographic documents which refer to a Makah settlement at or near the 45CA400 site area. Similarly, Waterman’s (1921) compilation of Makah place names does not offer a Makah name for the vicinity of the 45CA400 site area. The closest known Makah settlement was Deah, located approximately 1 mile to the northeast, at Neah Bay.

2.3.3 Archaeology

Appreciation of the archaeological context of the present study requires a brief review of the history of archaeology on Makah Indian Reservation, followed by a somewhat more detailed consideration of the work at 45CA400 itself.

2.3.3.1 Makah Indian Reservation Archaeology

The lands of the Makah Indian Reservation and its general vicinity have received more archaeological attention than almost any other similar-sized area in western Washington. Nevertheless, what we don't know about the prehistory of this area still remains impressive and much about the history and character of this work parallels larger regional patterns.

The history of archaeological investigations on the reservation began early in the 20th century, yet most of the work occurred within the last 30 years. Albert Reagan (1917) was the first person to publish accounts of shell midden deposits on shorelines near Cape Flattery. Reagan offered some brief observations about the structure and contents of these middens and noted a number of specific site locations. He apparently made minor cuts into some of the sites, but gave few details of the effort. There was no further investigation of archaeological sites in the area until Richard Daugherty undertook a site survey of the Washington Coast in 1948. Fred Pennoyer began to record additional shell midden sites along the Strait of Juan de Fuca a few years later. Neither Daugherty nor Pennoyer excavated sites, but they were the first to prepare modern Archaeological Site Inventory Forms for sites in the area. Archaeological site survey efforts specifically focused upon the Makah Indian Reservation began with Ed Friedman (1976). Working as a part of the Ozette Archaeological Project, Friedman recorded cultural deposits at a number of ethno-historically reported sites and conducted test excavations at five of them. In the years since Friedman's work, archaeological survey associated with land development (i.e., CRM archaeology) has become common on the reservation. Development-driven CRM archaeology has included the first efforts to investigate portions of the reservation other than shorelines and has recorded a number of archaeological sites. Much of the latter work was done by this author as a contractor. In 2001, the Makah Tribal Historic Preservation Office was established and it assumed the responsibility for inventorying archaeological resources here.

Archaeological site survey efforts on the Makah Indian Reservation, to date, have resulted in an inventory of approximately 35 sites. Another 25 sites have been recorded on lands near the reservation. The vast majority of these sites are shell midden deposits associated with modern marine beaches. Many of them are physical remains at locations which are also the subject of Makah oral history. Also present - - possibly in smaller numbers - - are lithic sites, petroglyph sites, culturally-modified trees, and sites containing evidence of the historic activities of non-natives peoples.

There have also been a number of important archaeological excavation efforts. The earliest and most sustained excavation effort in the area was Daugherty's work at Ozette [45CA24]. Large-scale excavations were conducted at Ozette in 1966 and 1967 and then from 1970 through 1981. Most of that effort focused upon ca. 300 to 400 year old waterlogged deposits containing large numbers of perishable artifacts (Samuels and Daugherty 1991). As noted earlier, Friedman undertook small-scale testing of five sites [45CA22, 45CA25, 45CA204, 45CA206, and 45CA207] on the reservation while the Ozette work occurred. Dale Croes began large excavations at a waterlogged site on the Hoko River [45CA213] in the mid 1970s (Croes and Blinman 1980) and then extend their work to testing a shell midden in a nearby rockshelter [45CA21] (Croes and Hackenberger 1988). Gary Wessen (1984 and 1993) conducted a limited testing of an older shell midden [45CA201] south of Ozette in 1979 and returned for more work at the site in 1992. During the 1990s, Wessen (1991 and 1992) undertook two additional small-scale test excavations at shell midden sites [45CA1 and 45CA22] on the Makah Reservation (Wessen 1991a and 1992) and David Conca (2000) made a significant effort at a lithic site [45CA432] located in the Olympic National Park near Lake Ozette. Most recently, the Makah Tribal Historic Preservation Office (THPO) has undertaken a program to study older shell middens similar to 45CA201. The first such effort was a small-scale test excavation of 45CA420 (Wessen 2003b). The second site to be investigated was 45CA3 (Wessen 2006). The third site to be investigated was 45CA400, the subject of the present report.

These studies have provided many valuable insights into prehistoric cultural activities in this region. Most of the tested sites contain great quantities of faunal remains, in addition to artifacts, and reflect highly sophisticated maritime traditions. Unfortunately, the sampled sites are not well distributed over the period that people have been in the region. At least eight of the 14 sites contain materials which represent cultural activity during the last ca. 1,500 years. At least four contain evidence of cultural activity between ca. 1,500 and 4,500 years ago. One site - - 45CA432 - - is undated, but is likely much older than 3,000 B.P. Thus, the great majority of the archaeological data currently available to us reflects the relatively recent early historic and late prehistoric past. In short, we have learned much about the character and details of how late prehistoric Makah people lived, but we know much less regarding how old those traditions are or how they came to be.

2.3.3.2 Previous Archaeology at 45CA400

45CA400 was recorded by Gary Wessen in 1988. The site was found by Paul Parker, who correctly recognized it probable significance and showed it to Wessen. Parker found the 45CA400 while preparing a timber sale in the vicinity of the site. At that time, this portion of the reservation was open range for cattle and the cows had created a trail in the forest that crossed the site area. Parker, observing where this trail crossed the terrace margin, noted the presence of a dense shell midden deposit. Wessen and Parker made an initial reconnaissance of the site area in November of 1988. While the area was thickly covered with vegetation, they quickly determined that the site was large. They estimated its size as approximately 110 by 25

meters. The initial reconnaissance confirmed that the site was rich in the bones of fur seals, other marine mammals, and marine fish. It also confirmed that chipped stone artifacts were present, an observation that led to speculation that the site might be relatively old. The proposed timber sale's boundaries were moved out of the site area and its remote location protected it from further impacts.

The first opportunity to assess 45CA400's age came in 1995. Wessen visited the area after a large windstorm and found that it had blown down numerous trees on the site. Shell midden deposits were visible in some of new exposures created by the blown down trees. Of some note, these exposures provided support for the observation that the midden was buried beneath a cultural deposit that lacks shell. Wessen collected a few large fragments of charcoal from the near the top of the shell midden, in an exposure at the western end of the site. The charcoal sample returned an age estimate of 2,690 ± 60 years B. P. (Beta-80923). This date confirmed the initial impression that it might be relatively old.

The next opportunity to examine the 45CA400 site area occurred when a Makah THPO crew composed of Wessen, Glenn Johnson, Rebekah Monette, and Crystal Thompson updated the site record for this site in 2000. This crew examined the site area through very dense vegetation and began to appreciate some aspects of it's structure. While few details were available, this investigation recognized that shell midden deposits were particularly thick on the western end of the site, and that cultural deposits with little or no shell were present on the eastern end of the site.

Interest in 45CA400 increased as the Makah THPO program to study older shell middens began in 2002. What little that was known about this site, was all consistent with the view that this was an older shell midden site associated with a higher than modern sea level stand. As such, we began to think about conducting a test excavation at the site. We understood that this would be a significant logistical undertaking, but everyone who had actually been to the site, was excited about it.

A second opportunity to obtain information about the age of 45CA400 occurred in the fall of 2004, when the OCNMS provided funding for radiocarbon dating to the Makah THPO. Some of this money was used to obtain better controlled dates from 45CA400. Wessen and Polly Debari returned to the site and made a soil auger probe close to the exposure where the 1991 charcoal sample was obtained. This probe suggested that shell midden deposits began at a depth of approximately 40 centimeters and extends to a depth of approximately 160 centimeters. Datable materials were then recovered from the top and the bottom of the shell midden deposits. A sample of marine shell from the base of the deposits returned a date of 3,360 ± 70 years B.P. (Beta-200632); Beta Analytic adjusted this age estimate to 3,780 ± 80 years B.P. A charcoal sample from the top of the shell midden deposits returned a date of 2,900 ± 100 years B. P. (Beta-200633). The date for the end of shell midden deposition obtained at this time (2,900 ± 100 years B. P.) is close to our first date for the site (2,690 ± 60 years B.P.). These two age

estimates are not actually contemporaneous, but they are relatively close. The basal date we obtained suggests that the shell midden deposits represent approximately 1,100 years of occupation.

The 2004 radiocarbon dates from 45CA400 were met with excitement. These two dates confirmed the conclusion that 45CA400 is a relatively old site. In particular, the 3,780 ± 80 date indicated that 45CA400 might be the second oldest site known on the Makah Indian Reservation. A site testing program was quickly developed and the field work portion of the effort was conducted in June and early July of that year.

3.0 RESEARCH DESIGN

The 45CA400 testing effort was designed to be a small scale data recovery effort conducted in order to support a judgment regarding the site's eligibility for listing with the National Register of Historic Places. Thus, the character of our work was strongly influenced by National Register criteria. The following sections describe the goals and methods of the 45CA400 Testing Project.

3.1 Research Goal

In simplest terms, the goals of the 45CA400 work were to collect descriptive data sets sufficient to support a formal nomination to the National Register of Historic Places and to do so in a resource-frugal way. We understood that the data collection would be conducted in the form of a test excavation and developed a work plan that included the concept that we would excavate the smallest volume necessary in order to get an appropriate sample.

The evaluation of 45CA400 was conducted within the context of the National Register of Historic Places criteria and guidelines specified in 36CFR 60.4. These state:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association:

A. that are associated with events that have had a significant contribution to the broad patterns in our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction or that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that have yielded, or may be likely to yield, information important in prehistory or history.

At the outset, we assumed that 45CA400 would be found eligible under Criterion D. (i.e., have yielded, or may be likely to yield, information important in prehistory or history). Thus, the practical goals of our excavation were clear. We wished to undertake a small-scale excavation and recover sufficient descriptive information about the site in order to both provide important information and demonstrate that it has the potential to provide substantially more important information.

Demonstrating the potential of the site is done by addressing certain specific conditions. First, we must show that the site has 'integrity'. That is, we must show that the depositional structure of the site remains intact and is intelligible. This is done by digging a test pit deep enough to examine the complete depositional sequence and documenting its condition. It is also important to show that the site contains materials which are relevant to important regional archaeological research themes. That is, showing that this site can help us better understand aspects of the prehistory of this region. This is done by documenting the age, contents, and character of the represented occupation and then relating the reconstruction to the regional research themes.

In their broadest terms, the regional research themes can be thought of as a number of generic questions such as:

How old, and how long, is the period represented by these cultural deposits?

What types of animal and plant resources were used by residents of 45CA400?

What do the assemblages of animals and plants tell us about what resources and places were important to the residents of 45CA400?

What do these assemblages tell us about the time(s) of year when 45CA400 was occupied?

What do these assemblages, and any other available data, tell us about what type of settlement 45CA400 was?

Is there any evidence that any of these economic conditions have changed during the period represented by these deposits?

Questions of this type are useful because they focus attention on issues which can probably be addressed with the kinds of materials we are likely to recover at the site. Their simple generic quality is also helpful in relating the results of different studies to each other. At the same time, the significance of a site is often easier to understand if its basic characteristics can be related to more specific research themes that have context within a particular region

In the case of 45CA400, we believe that this may be an older shell midden site and we have some knowledge about older prehistoric cultural behaviors. Thus, we can identify more specific research themes which 45CA400 might contribute to:

Are the cultural activities represented at 45CA400 related to cultural activities reported from nearby sites of similar age?

How are the cultural activities represented at 45CA400 and nearby sites of similar age related to more recent late prehistoric and early historic Makah cultural activities?

Do the cultural activities represented at 45CA400 provide information about possible environmental changes which have occurred during the period between its occupation and the present?

Many of these latter questions can be more problematic. Questions about 'how old?' or 'what plants and animals?' can usually be addressed with archaeological materials. Questions about assemblage characteristics and inferring human behaviors from them follow directly from the latter, but are often more complicated to resolve. In part, this is because our view of complicated issues can often be influenced by sample size. The testing, by design, will not generate a large sample. Thus, some of our reconstructions may really be little more than suggestions about how something may have been. It is important to recognize this aspect of our effort. Its scope is limited. It is equally important, however, to recognize that this limitation is not a serious difficulty for our research goals. Recall that our principal goal is to collect descriptive data sets sufficient to support a formal nomination to the National Register of Historic Places and, to be nominated, we must show only that the site has the potential (i.e., is 'likely') to yield information important in prehistory or history. Therefore, large scale efforts and detailed reconstructions are not needed at this time. Only clear demonstration that large scale efforts are possible and likely to be productive.

3.2 Research Methods

Our studies at 45CA400 relied upon standardized field and laboratory procedures. The archaeological techniques employed are well represented in this region. Sample recovery and description systems used at 45CA400 produced data sets which are compatible with data from most other sampled sites on the Makah Indian Reservation.

The recovery of cultural stratum samples from 45CA400 was accomplished as a controlled archaeological excavation. Excavation units were dug with a combination of trowels and shovels. All excavation and sample collection was conducted by 10 centimeter arbitrary levels *within* real stratigraphic units. All sediments recovered from each stratum were screened through 1/4 inch hardware mesh. An intact 1 liter volumetric sediment sample was recovered from each stratum for subsequent fine screening with 1/8 inch mesh. All artifacts, diagnostic faunal materials, and samples of charcoal and soil were collected and bagged for further study. Fire-cracked rocks were weighed in the field, but were not actually collected. When completed, the excavation walls were described and photographed, and then the pit was lined with plastic and backfilled.

Descriptive and interpretive studies of the cultural materials recovered from the sampling of 45CA400 were a major element of the investigations undertaken. Faunal remains were anticipated to comprise the overwhelming majority of the cultural materials likely to be encountered and the planned program of material culture studies was developed in this light. Artifacts were anticipated in smaller numbers, but the great interpretive value of these objects

made them a focus of particular interest nevertheless. The analytical techniques applied to these materials are well established in archaeology and are described briefly below. Additional details of particular studies are provided with the individual analytical summaries presented below in Chapter 5.

Faunal remains were the most abundant cultural materials recovered from 45CA400 and the site contains materials representing mammals, birds, fish, and shellfish. All recovered diagnostic material was cleaned, identified, and quantified, but the level of taxonomic identification varied due to the fragmented condition of certain classes of faunal remains. Similarly, an estimation of the Minimum Number of Individuals (MNI) for each class of faunal remains was considered, but was restricted in most cases due to fragmented condition, small sample size, or both. As a result, most faunal classes are quantified in terms of Number of Identified Specimens (NISP). The described individual stratum faunal assemblages were then utilized as a basis for inferring what we could about environmental setting, economic orientation, and occupation seasonality.

Artifacts were treated in a manner broadly analogous to that of faunal materials. Instead of being sorted into faunal classes, artifacts were first sorted with reference to the materials of manufacture, and then with reference to the functional categories represented. All recovered artifacts were cleaned, identified, and quantified, but the level of identification varied due to the fragmented condition of some objects. At the outset, it was hoped that individual stratum artifact assemblages could be utilized as a basis for inferences regarding cultural behaviors associated with each stratum.

Finally, charcoal for possible radiocarbon dating was collected from every arbitrary level where it was encountered.

4.0 FIELD WORK AND FIELD FINDINGS

The discussion of the field results in this chapter is focused in terms of the site's structure. Consideration of 45CA400's contents are, for the most part, described in the presentation of material culture studies in Chapter 5. One exception, however, is the account of site chronology - - based upon radiocarbon dates - - which follows immediately after the presentation of depositional structure below. Appreciation of the temporal dimensions of the occupation(s) are most appropriate at this point, and the knowledge provides a useful backdrop to subsequent discussion. Before turning to the field results, however, a brief account of the field work is required.

4.1 Field Work

The work described in this report includes a 10 day test excavation conducted as a field school and survey work undertaken in preparation for that effort. The field school was a collaborative project in which faculty and students from Pacific Lutheran University and Peninsula Community College worked with Makah THPO personnel. Faculty and students from Pacific Lutheran University included David Huelsbeck, Catherine Beard, Sang Han, Jeff Horton, Nicole Holmes, Stefanie Midlock, John Rowell, and Justin Sobania. Faculty and students from Peninsula Community College included Jeff Mauger, Pete Steelquist, Gail Roemer, Raena Young, and Sherri Anderson. Makah THPO personnel included Gary Wessen, Rebekah Monette, and Glenn Johnson. The fieldwork was co-directed by Wessen and Huelsbeck. A supporting field laboratory operation was directed by Mauger. The work occurred in June and July of 2006. The weather during this period can be described as ‘seasonal’. Conditions were generally warm and clear, but significant rainfall occurred during the second half of the field school.

A significant amount of work needed to be undertaken prior to the field school. The site is located in a relatively remote densely forested area on the reservation and, given these conditions, we knew relatively little about the site area. As such, it was necessary to both develop a trail to the site and to select a location within it where the test excavation would occur. The first effort was to develop a trail to the site. Rebekah Monette and Glenn Johnson explored several possible routes, ultimately deciding on an alignment that reached the eastern end of the site from a point on the north side of the Wa’atch River. The selected route included a crossing of the river and approximately 0.4 mile of trail. Johnson did most of the heavy work, actually building the trail. Sections were cut through numerous blown-down tree trunks and some of the resulting wood was used to assist crossing swampy areas.

Once a useable trail was established, survey work was conducted within the site area in order to select a location for the test excavation. This effort was hampered by the very dense vegetation and numerous blown-down trees here. Exploration of the site area was conducted by Monette, Johnson, and Wessen from the Makah THPO and benefited from additional assistance from Bob Steelquist of the OCNMS, Olympic National Park archaeologists David Conca and Kim Kwarsick and Pacific Lutheran student Jeff Horton. The first portion of the effort was a ground surface inspection that revealed important new insights into the site's structure (see Figure 3). In particular, it showed that while high density shell midden deposits were common in the western half of the site area, much of its eastern half appeared to consist of organically-stained deposits that contain only limited quantities of marine shell. Ground conditions prevented us from mapping the distributions of these two types of deposits, but we became increasingly confident that this characterization is generally accurate. The ground surface inspection also encountered a small number of significant artifacts. The most significant are two chipped stone projectile points encountered at the eastern end of the site (see Section 5.2.1.2). A third object of interest is a small fossil of a marine snail we encountered near the western end of the site (see Section 5.2.2). The last item worthy of comment here is a piece of a small cast iron stove, also encountered at the western end of the site. The latter is the first historic object we observed in the site area. We know of no historic settlements in the general vicinity of 45CA400 and the presence of an iron stove came as a considerable surprise.

The initial ground surface inspection was followed by a limited probing of the site with a 3 inch diameter soil auger. This action was undertaken in an effort to better understand the character and depth of the cultural deposits in different portions of the site area. Ground conditions made regular spacing of the probe locations difficult, but we were initially able to probe at approximately 20 meter intervals along the long axis of the site. The results from these probes confirmed our earlier observation that high density shell midden deposits were common in the western half of the site area, while much of its eastern half consists of organically-stained deposits that contain only limited quantities of marine shell. The shell midden deposits to the west are often buried beneath 40 to 60 centimeters of soil, very thick (often more than 2 meters) and internally complex. In contrast, deposits to the east appear to be thinner (60 to 85 centi-meters), less internally complex, and to contain much lower densities of cultural materials. These results were daunting. While testing the eastern end of the site held the prospect of producing only a limited sample, testing the western end threatened to be more than we could accommodate in the planned 10 day effort. We made a decision to test the western end of the site and then undertook a second round of soil auger probing here in an effort to identify an appropriate (i.e., manageable) location for our excavation. Nine additional locations were probed on the western end of the site. The second round of soil auger probing reinforced our earlier finding that the midden deposits are often buried beneath 40 to 60 centimeters of soil, very thick (often more than 2 meters) and internally complex. Complexity was noted both in multiple strata at any single sampled location and in observed variation from one sampled location to another.

In the end, we decided to locate the test excavation near the blown-down tree exposure where the earlier 1991 and 2004 radiocarbon dates were obtained (see Figure 3). While soil auger probing in this area indicated that the cultural deposits extended to a depth of greater then 2.5 meters - - and we were not confident that we could reach the bottom during the 10 day effort.

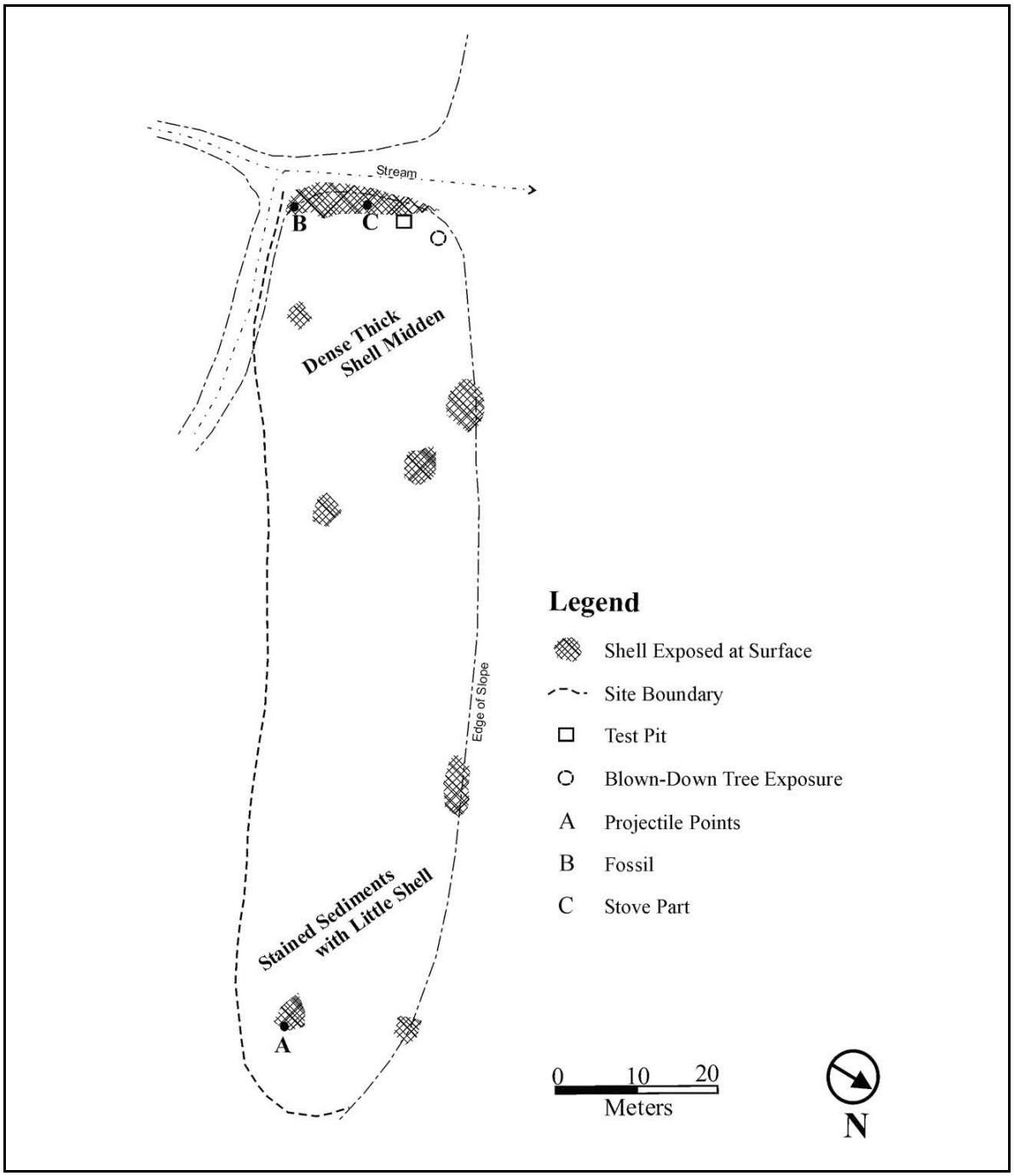

Figure 3 Location of Test Pit 1, 45CA400, Makah Indian Reservation, Washington.

- - we felt that it was wise to work in an area where we already had some chronological controls. The anticipated depth of the excavation also raised concerns about safety. We would need to dig to a considerable depth and excavation shoring was not available. As such, the following strategy was adopted. The initial excavation would be conducted in a 2 by 2 meter test pit. When the excavation reached a depth of 1.5 meters, the pit would be reduced to a 1 by 1 meter excavation located in the center of the 2 by 2 meter pit. We would dig no deeper than an additional 1.5 meters in the 1 by 1 meter pit. This strategy would allow us to reach a maximum depth of 3 meters below the surface with no vertical wall being greater than 1.5 meters tall. If the cultural deposits actually extended to a depth of greater than 3 meters, we would not be able to sample the lowest portion of them at this time.

Excavation of the 2 by 2 meter test pit began with the arrival of field school students on the 28th of June. Digging proceeded relatively quickly at first, but the pace slowed considerably once the high density shell midden deposits were encountered. A depth of 1.5 meters was reached early in the day on 6 July - - the eighth day of the planned 10 day effort - - and the pit was reduced to a 1 by 1 meter excavation. By the middle of the following day, we had reached a depth of 2.2 meters. At this point, we chose to probe deeper with the soil auger and determine if digging to our maximum allowable depth of 3 meters would enable us to reach the bottom of the cultural deposits. The soil auger indicated that approximately 90 centimeters of additional shell midden deposits remained. Beneath this was a layer of clayey sand that appears to lack shell or bone, but does contain charcoal and may also be a cultural deposit. The soil auger results convinced us that it would not be possible to reach the bottom of the site and we therefore decided to terminate digging at the depth of 2.2 meters. The remainder of the day and 9 July were used to record stratigraphic profiles, collect matrix samples for subsequent fine screening, line and backfill the test pit, and remove samples and excavation gear from the site area. We hope to return and complete the excavation at a later data.

4.2 Depositional Structure

The principal mechanism for investigating the structure of the western end of 45CA400 was the excavation described above. The upper portion of the depositional structure revealed in our test pit had been somewhat disturbed by a number of linear features that appear to be root casts and/or animal burrows. It is also likely that that some of the top of this profile has been disturbed by historic activities such as logging. Despite this, however, stratigraphic relationships were generally clear and consistent within our excavation unit. The recorded stratigraphic profile for this portion of 45CA400 is represented in Figures 4 and 5 and described in Table 1.

Figure 4 Test Pit 1, 45CA400, Makah Indian Reservation, Washington. The west, north, and east walls are visible in this view.

The depositional structure of this site is complex and the limited character of our testing effort could not address all of the subtler details of this structure. Nevertheless, we are confident that the reconstruction reported here reflects much of the basic depositional structure of this portion of the site. The reconstruction we recorded consists of 12 major depositional strata, the first 10 of which were sampled during the excavation. Strata XI and XII were identified during soil auger probing of the sediments below our excavation. As such, we have relatively little information about the lowermost two strata. It should also be noted that, after it was completed, Stratum I was observed to contain a subtype. The subtype represents a relatively minor variation in the major depositional unit's character. We acknowledge that the subtype was not immed-iately apparent to us and thus our sampling does not reflect the distinction between the major depositional unit and its associated subtype. In hindsight, Stratum I probably could have been divided into several smaller units.

The uppermost portion of the profile is a thin layer of organic litter or duff. It has no mineral fraction, but was observed to contain historic archaeological material; it was not given a

stratum designation. Stratum I is a very dark grayish brown sandy silt. It ranges in thickness from approximately 40 centimeters to more than 150 centimeters in thickness. The deposit has

TABLE 1 A STRATIGRAPHIC PROFILE DESCRIPTION FOR TEST PIT 1, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

Stratum	Description
I	Very dark grayish brown (10YR3/2); sandy silt with many roots, root casts and/or rodent burrows, approximately 5% subrounded gravel and small cobbles, historic debris, chipped stone, fire-cracked rocks, charcoal, bones, and a very low density of highly fragmented shell dominated by Sitka periwinkle; no apparent structure; non-sticky; non-plastic; very weak smear (dry); abrupt irregular boundary.
Ia	Essentially the same as I, but very dark brown (7.5YR3/2).
II	Grayish brown (10YR5/2); sandy silt with approximately 10% subrounded gravel and small cobbles, chipped stone, bone artifacts, fire-cracked rocks, charcoal, bones, and a very high density of variably fragmented shell dominated by Sitka periwinkle, butter, and horse clam; occasional laminar bedding; possible post or stake molds; non-sticky; non-plastic; moderate smear (dry); clear irregular boundary.
III	Very dark gray (10YR3/1); silt loam with approximately 5% subrounded gravel and small cobbles, bone artifacts, fire-cracked rocks, charcoal, bones, and a low to moderate density of highly fragmented shell dominated by Sitka periwinkle and butter clam; no apparent structure; non-sticky; non-plastic; moderate smear (dry); clear irregular boundary.
IV	Very dark gray (5YR3/1); silt loam with approximately 15% subrounded gravel and small cobbles, fire-cracked rocks, charcoal, bones, and a moderate density of highly fragmented shell dominated by Sitka periwinkle and butter clam; no apparent structure; slightly sticky; slightly plastic; moderate smear (dry); clear smooth boundary.
V	Brown (10YR4/3); sandy silt with approximately 5% subrounded gravel and small cobbles, chipped stone, fire-cracked rocks, charcoal, bones, and a moderate density of moderately fragmented shell dominated by Sitka periwinkle; no apparent structure; non-sticky; non-plastic; weak smear (dry); clear smooth boundary.
VI	Light grayish brown (10YR6/2); fine sand with approximately 15% subrounded gravel and small cobbles, fire-cracked rocks, charcoal, bones, and a low to moderate density of highly fragmented shell dominated by Sitka periwinkle; no apparent structure; non-sticky; non-plastic; weak smear (dry); clear smooth boundary.
VII	Gray (10YR5/1); sandy silt with approximately 5% subrounded gravel and small cobbles, chipped stone, bone artifacts, fire-cracked rocks, charcoal, bones, and a high density of variably fragmented shell dominated by Sitka periwinkle and horse clam; no apparent structure; non-sticky; non-plastic; moderate smear (dry); clear smooth boundary.
VIII	Light grayish brown (10YR6/2); fine sand with approximately 15% subrounded gravel and small cobbles, chipped stone, bone artifacts, fire-cracked rocks, charcoal, bones, and a low to moderate density of moderately fragmented shell dominated by horse clam; no apparent structure; non-sticky; non-plastic; weak smear (dry); clear smooth boundary.
IX	Dark grayish brown (10YR4/2); fine sand with approximately 15% subrounded gravel and small cobbles, chipped stone, charcoal, bones, and a low to moderate density of highly fragmented shell dominated by steamer clam; no apparent structure; non-sticky; non-plastic; weak smear (dry); clear smooth boundary.
X	Light grayish brown (10YR6/2); fine sand with approximately 20% subrounded gravel and small cobbles, fire-cracked rocks, charcoal, bones, and a low to moderate density

	of variably fragmented shell dominated by Sitka periwinkle; no apparent structure; non-sticky; non-plastic; weak smear (dry); clear smooth boundary.
XI	Brown (10YR4/3); sandy silt with approximately 5% subrounded gravel and small cobbles, charcoal, and a low to moderate density of highly fragmented shell (apparently) dominated by butter clam; no apparent structure; slightly-sticky; slightly-plastic; weak smear (moist); clear smooth boundary.
XII	Yellowish brown (10YR5/6) sandy clay with weak FeO_2 staining, ca. 15% rounded gravel and charcoal; no apparent structure; non-sticky; weakly plastic; very weak smear (moist).

clearly been disturbed by tree roots and/or burrowing animals. While less clear, it is very likely that at least the upper portion of it has also been disturbed by historic logging activities. Unrecognized until the testing began, this stratum contains historic artifacts, much older chipped stone artifacts, bone, and fire-cracked rocks. Stratum I also contains a very low density of highly fragmented marine shell; we strongly suspect that at least some of this shell is from Stratum II and has been re-worked into Stratum I by one or more of the disturbance mechanisms noted above. A zone of slightly darker sediment is present at the bottom of this deposit, in the southeastern portion of our test pit, and has been designated Stratum Ia. Beneath Stratum I is a grayish brown sandy silt shell midden deposit designated Stratum II. Stratum II is variable in thickness; in the western portion of our test pit it is approximately 50 centimeters thick and is wholly absent in the southeast. The Stratum II deposit is marked by a number of vertical truncations, some of which may be pits or casts from structural remains. Stratum II is also marked by 'bands' or laminar beds of varying density of shell, but - - overall - - this is a very high density shell midden deposit. Stratum III is a mass of very dark gray silt loam shell midden deposit that is present only in the southwestern portion of our pit. It is approximately 40 centimeters. It contains only a relatively low density of shell and associated material. Stratum IV is another very dark gray silt loam shell midden deposit. It appears as a lens approximately 10 centimeters thick immediately below Stratum III. As compared to the latter, Stratum IV has a higher gravel content and distinctly higher densities of shell and fish bone. Stratum V is a brown sandy silt shell midden deposit that is present over much of the excavation pit. It is most continuous in the east and thins toward the west. Stratum VI is a light grayish brown fine sand shell midden deposit that appears as a lens of material directly under Stratum II in the north-western portion of the pit. It is never more than 25 centimeters thick and contains only relatively low densities of shell and bone and is analogous to Stratum III. Stratum VII is a broad 40 centimeter thick gray sandy silt shell midden deposit. It contains very high densities of most materials, although its density values do not approach those noted for Stratum II. Stratum VIII is a light grayish brown fine sand shell midden deposit that closely resembles Stratum VI. Unlike the latter, however, Stratum VIII appears to be much more continuous and significantly thicker. Stratum IX is a dark grayish brown fine sand shell midden deposit that is present mostly in the eastern portion of our test pit. It is up to 25 centimeters thick and superficially resembles Stratum VIII. It is, however, darker in color and contains somewhat lower densities of shell and

bone. Stratum X is yet another layer of light grayish brown fine sand shell midden deposit that resembles Strata VI and VIII. Its gravel content appears to be slightly greater, but is otherwise quite similar. Stratum XI may be the lowest shell midden deposit in this profile. Its shell density appears to be relatively low, but it has not actually been sampled and we know little about it. Finally, Stratum XII is the lowest deposit we currently know of. It is a yellowish brown sandy clay with weak FeO_2 staining. It does contain small quantities of charcoal, but no unequivocal cultural materials have been observed within it. Thus, whether Stratum XII is a cultural deposit remains uncertain at this writing.

Interpreting this sequence, it is clear that most - - if not all - - of this depositional sequence consists of cultural deposits. Stratum I has many characteristics of a forest soil 'A' Horizon, yet it contains a considerable quantity of cultural materials. As already noted, it has been disturbed and it is possible that some of the materials in it may actually have been derived from Stratum II below. Nevertheless, there can be no doubt that cultural activities were occurring at the site during at least part of interval represented by this stratum. In fact, both historic materials and much older prehistoric cultural materials are present in Stratum I; suggesting the possibility that two distinct occupations - - separated by a lengthy hiatus - - are represented. Strata II through XI are shell midden deposits. Some of the latter - - particularly Strata II and VII - - have characteristics that suggest they may represent dumps or refuse heaps. None of them have characteristics that clearly suggests house floor deposits. Whether this depositional sequence actually contains the complete occupation history of 45CA400 is unclear. As noted above, Stratum XII may represent a non-shell cultural deposit or it may be a much older naturally-occurring deposit that pre-dates the cultural occupation. Information available to us at this time is simply insufficient to resolve this matter.

Before leaving the subject of interpreting the depositional sequence, it is worthwhile to briefly return to the vertical truncations noted earlier in Stratum II. Some of these features are evident in the stratigraphic profiles, others were encountered wholly within the excavation area. The significance of these features is uncertain and we do not assume that they all represent the same condition. Some may actually represent animal burrows, but the very vertical character of others suggests that they may represent some type of cultural feature. Unfortunately, we can add little to this subject that offers useful insights. When plotted, the truncations do not suggest a wall line or any other type of obvious structural feature, nor are there any horizontal stratigraphic boundaries that appear to be associated with them. As already noted, there are no deposits that have characteristics which clearly suggests house floor deposits. The fact that the truncations are evident in Stratum II suggests that - - if a structure is indicated - - it may post-date the shell midden deposition.

Our test excavation at 45CA400 addressed a 2 square meter area and sampled a total volume of approximately 6.7 cubic meters. The approximate volumes of each of the major depositional strata exposed in this test pit are summarized in Table 2.

TABLE 2 A SUMMARY OF THE EXCAVATED STRATUM VOLUMES (M3) AT 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON

STRATUM	I	II	III	IV	V	VI	VII	VIII	IX	X
VOLUME	3.14	0.70	0.31	0.10	0.48	0.27	0.85	0.51	0.12	0.22

Having determined the individual strata volumes, it is possible to calculate the densities of the various cultural materials encountered in these deposits. Density values from the 1/4 inch screening are presented in Table 3 and they offer a useful elaboration on the stratum descriptions in Table 1. Note first that the distinction between the almost shell-free Stratum I and the underlying shell midden strata is dramatically clear. Stratum I can be seen as rich in chipped stone and fire-cracked rocks while containing only modest quantities of bone, and shell. Stratum I also contains historic objects. In contrast, most of the shell midden strata are very different. The latter deposits contain much higher quantities of bone, and shell than Stratum I. They also contain bone and shell artifacts and lack historic objects. Chipped stone artifacts also occur in

TABLE 3 A SUMMARY OF THE DENSITIES (/M3) OF CULTURAL MATERIALS, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

	STRATUM									
Material Type	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Historic Artifacts	43	-	-	-	-	-	-	-	-	-
Chipped Stone Artifacts	47	12	4	10	9	-	13	58	67	14
Other Stone Artifacts	3	3	3	-	2	-	2	2	-	-
Bone Artifacts	-	3	7	-	-	-	2	2	-	5
Shell Artifacts	-	3	-	-	-	-	2	-	-	-
Fire-Cracked Rocks	304	749	23	220	15	-	97	38	-	50
Marine Shell	107	38,182	739	2,040	2,173	930	9,485	1,738	742	864
Mammal Bones	2	110	42	-	7	4	46	30	-	14
Fish Bones	18	6,746	426	1,350	1,061	152	1,065	553	17	310
Bird Bones	2	138	36	30	17	12	78	116	125	28

the shell midden deposits, although they usually occur in lower densities than Stratum I. (In this regard, however, note that Strata VIII and IX actually have chipped stone densities greater than Stratum I. This is very unusual.) Among the shell midden strata, the particularly rich character

of Stratum II is clearly apparent. Stratum II has the highest densities of fire-cracked rocks, shell, and all types of bone. Stratum VII can also be seen as rich in most types of shell midden materials. Alternatively, Strata III and VI are low density shell midden deposits.

4.3 Site Chronology

Radiocarbon dating was employed in order to obtain estimates of the ages of the cultural deposits at 45CA400. As described earlier in Section 2.3.3.2, three radiocarbon dates were available prior to the 2005 field school. Four additional samples were run in association with the field school. Thus, a total of seven radiocarbon dates represent the cultural deposits at 45CA400. The four samples obtained during the 2005 field school include three aggregates of charcoal collected from one arbitrary level representing a stratum in the excavation and a single sample of marine shell collected from an exposure on the eastern end of the site. All samples were prepared and counted by Beta Analytic, Inc., who determined C^{14} and the C^{12}:C^{13}. By convention, radiocarbon dates are reported in C^{14} years B. P. (before present), taking the year 1950 A. D. as the present. C^{14} years are not the same as calendar years, but calculation of the C^{12}:C^{13} allows for a better estimation of the probable calendar year age of the sample. The measured and conventional C^{14} year estimates for all of the 45CA400 samples are presented in Table 4. The radiocarbon lab worksheets for these samples are presented in the Appendix A.

TABLE 4 RADIOCARBON DATING ESTIMATES FOR SAMPLES FROM 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

Sample Source	Sample No.	Material	Measured Age	Conventional Age
1995 Tree Exposure	Beta-80923	Charcoal	2,690 ± 60	2,690 ± 60
2004 Soil Probe	Beta-200362	Charcoal	2,900 ± 100	2,900 ± 100
2004 Soil Probe	Beta-200363	Shell	3,360 ± 70	3,780 ± 80
2005 Stratum I	Beta-209058	Charcoal	2,870 ± 70	2,850 ± 70
2005 Stratum II	Beta-209059	Charcoal	2,990 ± 60	3,020 ± 60
2005 Stratum XII	Beta-206985	Charcoal	3,170 ± 40	3,170 ± 40
2005 East End of Site	Beta-209060	Shell	3,980 ± 70	4,380 ± 70

The seven radiocarbon dates reported in Table 4 reflect three distinct episodes of work that can be thought of as representing increasingly refined efforts to address the basic temporal parameters of the occupations represented at this site.

The 1995 date represents the first effort to assess the site's age. The sample was collected from an exposure made by a blown-down tree. Its precise stratigraphic position was not determined, but we can say that it came from close to the top of the shell midden. Thus, it can be considered to be at least broadly equivalent to the upper portion of Stratum II in the 2005 excavation. This sample produced an age estimate of 2,690 ± 60 years B. P.

The 2004 soil probe dates were obtained from samples that were expected to reflect the duration of the interval represented by the shell midden deposits. They were collected from a location approximately 3 meters from the blown-down tree exposure sampled in 1991. Material recovered from what was believed to be the base of the deposit did not contain sufficient charcoal, and a sample of shell was therefore used. (In principal, the represented stratum should be at least broadly equivalent to Stratum X in the 2005 excavation. The 2004 basal stratum, however, differs significantly from Stratum X in the 2005 excavation.) The sample produced a conventional age estimate of 3,780 ± 80 years B. P. Alternatively, the very top of midden was rich in shell. Charcoal collected here produced an age estimate of 2,900 ± 100 years B. P. The 2004 soil probe dates were met with considerable interest. The lower date, as corrected, is among the oldest available for shell midden deposits anywhere on the outer coast of Washington. The upper date caused some concern as it is slightly older than the date from the nearby blown-down tree exposure obtained in 1991. When the two dates (i.e., 2,690 ± 60 and 2,900 ± 100) are compared at two sigma, they are close, yet their ranges do not actually overlap. This argues that the 2004 sample is slightly older than that collected in 1991.

Three of the four dates obtained in 2005 represent our test excavation unit. As described earlier, the 2005 test excavation was located in the immediate vicinity of the 2004 soil probe and the blown-down tree exposure sampled in 1991. Two of these three samples were intended to provide additional information about when the shell midden deposition ended. One charcoal sample represented the very bottom of Stratum I (the non-shell deposit overlying the midden) and the second represented the very top of Stratum II. The samples produced age estimates of 2,850 ± 70 and 3,020 ± 60 years B. P., respectively. These results are in correct stratigraphic order. They are also consistent with the 2004 soil probe date of 2,900 ± 100 years B. P. for what is essentially the top of Stratum II. The third date obtained from the 2005 test excavation represents Stratum X. This sample produced an age estimate of 3,170 ± 70 years B. P. This is clearly much younger than - - and inconsistent with - - the age estimate of 3,780 ± 80 years B. P. obtained from the 2004 soil probe.

The last of the dates obtained in 2005 represents an effort that begins to address other portions of the site. All of the samples considered thus far come from a single relatively small area on the extreme western end of the site. We therefore chose to run a single sample from the eastern end of 45CA400. Our 2005 soil auger probing indicated that shell deposits were uncommon on this end of the site. Rather, this area contains extensive organically-stained deposits containing chipped stone, bone, and fire-cracked rock. Despite the soil staining, however, we encountered very little charcoal here. We therefore elected to obtain a date from shell exposed in an animal burrow. Thus, we cannot actually describe the stratigraphic context of this sample, nor is it possible to suggest a possible equivalence to any particular stratum in the 2005 test excavation. The sample produced a conventional age estimate of 4,380 ± 70 years B. P. This is the oldest date yet obtained for 45CA400.

Overall, the radiocarbon dates available from 45CA400 provide some broad insights into the temporal range of the occupation, yet there are significant gaps and some problems in the details. We do not know when the prehistoric occupation of this site ended. We can note, however, that there was not a Makah settlement at this location in the early historic period, nor is there a traditional Makah place name for this location. These last observations suggest that the 45CA400 site area has been abandoned for a considerable period of time. It appears that shell midden deposition - - at least on the western end of the site - - ceased ca. 2,900 years B. P. When the shell midden deposition in this area began is less clear. We currently have estimates of ca. 3,100 and 3,800 years B. P. While additional data will be necessary to clarify this matter, both the considerable quantity of cultural debris and the early date from the eastern end of the site suggest that the 3,800 year estimate may be more accurate. The single date from the eastern end of the site suggests that cultural activities here may have preceded those at the western end by as much as 500 years.

The inconsistencies in the dates we have are of some concern, but they are not considered to be great problems. We can be confident that most of the shell deposits date to between ca. 3,000 and 4,000 years B. P. Slightly older and younger cultural deposits also appear to be present. Some of the inconsistencies may be attributable to how the samples were collected and we think that the site area's apparently complex internal structure may also be reflected in this small sample.

5.0 THE ANALYSIS OF CULTURAL MATERIALS

This chapter presents the findings of the analyses undertaken with the various classes of cultural materials recovered during the excavations conducted at 45CA400. Cultural materials to be considered include historic artifacts, prehistoric artifacts, fire-cracked rocks, and faunal remains. Each class of objects will be described and briefly compared to other sites in this region. As faunal remains are the most abundant materials recovered from the site, they were the focus of most of the analyses. Discussion will include strata summaries for each class on a class-by-class basis; integrated accounts of the strata and their probable significance are presented in Chapter 6.

5.1 Artifacts

The test excavation at 45CA400 produced a sample 373 artifacts. Five additional artifacts were collected from the surface during our investigation of the site area immediately prior to the test excavation, and so a total of 378 artifacts are available for study. The artifacts we collected have been classified in terms of six broad categories: historic artifacts, chipped stone debitage, chipped stone tools, other stone artifacts, bone and tooth artifacts, and shell artifacts. All of the categories we use are well known in this region. A summary of the artifact distribution, by strata, is presented in Table 5.

TABLE 5 A SUMMARY OF THE DISTRIBUTION OF PREHISTORIC ARTIFACTS, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

	STRATUM									
Material Type	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Historic Artifacts	133	-	-	-	-	-	-	-	-	-
Chipped Stone Debitage	139	8	1	1	4	-	11	22	7	2
Chipped Stone Tools	8	-	-	-	-	-	-	1	-	-
Other Stone Artifacts	10	2	1	-	1	-	2	1	-	-
Bone/Antler/Tooth Artifacts	-	10	2	-	-	-	2	1	-	1
Shell Artifacts	-	2	-	-	-	-	1	-	-	-

All of the major patterns in the distribution of artifacts are evident in Table 5. Many of these patterns were also apparent in Table 3. Note that while a clear majority (62%) of all artifacts were recovered from Stratum I, nearly all of the items in this assemblage are chipped stone debitage. All shell midden artifact assemblages are far smaller. Among the latter, relatively large artifact assemblages were recovered from Strata II, VII, and VIII. All other shell midden strata are represented by only very small numbers of artifacts. Finally, note the clear contrast between the in assemblage contents between Stratum I and the shell midden deposits. Most of the recovered chipped stone artifacts represent Stratum I while artifacts of bone, tooth, and shell were only encountered in the shell midden deposits. Very similar patterns in the distribution of artifacts were also observed at the roughly contemporaneous nearby sites 45CA420 (Wessen 2003) and 45CA3 (Wessen 2006a).

Brief accounts of each artifact class are presented below.

5.1.1 Historic Artifacts

A surprisingly large number of historic artifacts were collected during the test excavation at 45CA400. They included a single object encountered in the duff - - above the top of the mineral soil - - and 132 additional items encountered in the uppermost 40 centimeters of Stratum I. Specimens encountered in Stratum I were heavily concentrated between 10 and 30 centimeters below the surface. Only seven artifacts were recovered from Excavation Level 4 (30 and 40 centimeters below the surface).

The specimen encountered in the duff is a complete machine-made clear glass bottle. It is a one quart bottle, square in cross-section, with a short narrow neck and molded threads indicating that it had a screw-on cap. It is unmarked except for an embossed triangle and a small "6" on its base. The bottle is not obviously a beverage container and we cannot suggest its probable contents.

The vast majority (92%) of the objects encountered in Stratum I are machine-made wire common nails. All are heavily rusted and many are bent. Twenty of the these appear to be approximately 30d (4.5 inch) nails and another twenty are approximately 8d (2.5 inch) nails. Eighty-one specimens in this group are small fragments of nails whose size cannot be reconstructed with confidence. Judging from the observed widths, however, many of the nail fragments are at least broadly consistent with the 8d nails and clearly smaller than the 30d nails. The remaining 11 historic artifacts are a heterogeneous group. Seven of the 11 are small pieces of weathered leather with one or more heavily rusted metal rivets through them. These objects have not been positively identified, but may be fragments of heavy leather boots similar to those typically worn by loggers. Two small pieces of rusted metal appear to be a fragment of a light gauge wire and a fragment of a tin can. The last two objects encountered in Stratum I are a fragment of fire brick and a fragment of burnt material that appears to be some type of stove slag. While not all of these artifacts are datable, all of those that can be assigned a date appear to

represent the 20th Century. Given the rusted condition of the nails and the presence of the leather, we suspect that a early to mid 20th Century date is most likely.

The presence of these objects was something of a surprise, but perhaps they shouldn't have been since a we did locate a piece of a small cast iron stove on the site's surface not far from our excavation. The recovered objects suggest that a structure was present in this area. The paucity of domestic refuse suggests that it was probably not a residence and we suspect that it may have been related to logging.

5.1.2 Prehistoric Artifacts

Prehistoric objects account for approximately 65% of all artifacts recovered from 45CA400. As noted earlier, most of the latter are pieces of chipped stone debitage; byproducts of the production of chipped stone tools. Examples of finished chipped stone tools are relatively uncommon at the site. Beyond chipped stone, small numbers of other stone, bone, antler, tooth, and shell objects were also collected.

5.1.2.1 Chipped Stone Artifacts

Chipped stone objects are, by far, the most abundant materials represented in the artifact collection from 45CA400. They account for 206 (84%) of the 245 prehistoric artifacts in the collection. The chipped stone artifacts have been divided into two basic categories: debitage and tools. Debitage - - also referred to as waste flakes or chipping debris - - are the byproducts of any type of stone chipping. They represent the discarded material struck off while shaping a piece of stone. This definition does not discount the fact that waste flakes may be produced which are then later used - - with or without further shaping - - as tools. Tools are objects - - usually, but not always, shaped - - which are used for some purpose within the context of a technological process.

The raw material classification used by this study was based upon direct observation of the specimens from 45CA400 and familiarity with other prehistoric chipped stone assemblages from this region. No geochemical and/or petrographic techniques were used to identify rocks from the site. This has limited the specificity of description in some cases. The examination of this collection led to the recognition of six raw material types at 45CA400. These types and frequencies of these specimens are summarized in Table 6. Their distributions are summarized in Figure 7.

Taken together, the values in Table 6 and Figure 6 clearly reflect the basic characteristics of the chipped stone raw materials and their distribution in the site. While six varieties of stone are present, three of these types - - basalt/dacite, shale/slate, and quartz - - account for approximately 91% of all specimens. There are also distinct patterns in the distributions of these materials. Slightly more than seven out of every 10 chipped stone objects represent Stratum I.

TABLE 6 A SUMMARY OF THE FREQUENCY OF CHIPPED STONE RAW MATERIALS, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

Raw Material Type	NISP
Quartz	50
Quartzite	1
Shale/Slate	66
Basalt/Dacite	72
Other Volcanics	11
Cryptocrystalline Silicates	6

Moreover, nearly all of the shale/slate and quartz artifacts recovered from the site come from

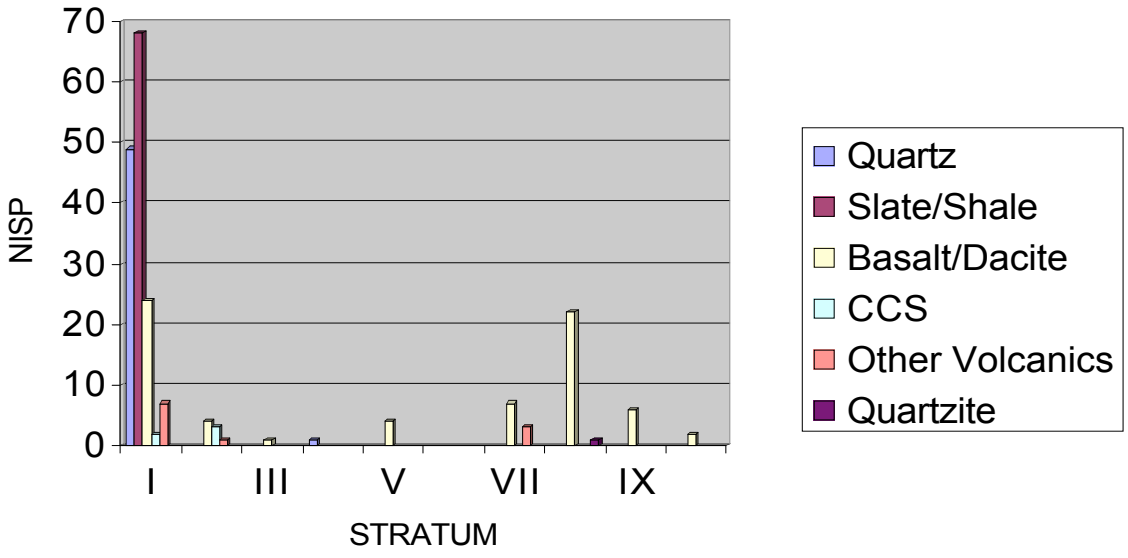

Figure 6 Distribution of chipped stone raw materials by strata, 45CA400, Makah Indian Reservation, Washington.

Stratum I. These materials are very rare in the shell midden deposits. In contrast, while examples of basalt/dacite are common in Stratum I, they also occur in most of the underlying shell midden deposits. Note that there is a distinct second 'peak' in their frequency in the lower part of the profile (i.e., in Strata VII, VIII, and IX).

The most abundant stone in the collection is referred to as 'Basalt/Dacite'. These are dark fine-grained mafic volcanic rocks which occur as well-rounded cobbles and pebbles. They represent approximately 35% of the chipped stone. While some variation is evident in this group as well, it is clear that most of the specimens appear to be a single material. This common material appears to be a vitrophyric dacite much like that described by Bakewell (1993). If this last observation proves to be correct, then the ultimate source of this stone may be in British Columbia. If this stone originated in Canada, however, it was probably transported to the northwestern Olympic Peninsula by Pleistocene glacial ice and then was later collected locally for use.

The next most numerous group is 'Shale/Slate'. It is nearly as abundant in the collection (accounting for approximately 32%) although, as noted, it is strongly concentrated in Stratum I. This group is heterogeneous and most of the specimens are grainy relatively low quality materials (for tool stock). Both shale and slate are available on the Olympic Peninsula and we believe that most of the material in the 45CA400 collection probably comes from local sources. This interpretation is based in the view that the low quality stones were unlikely to have been attractive trade commodities.

Quartz accounts for approximately 24% of all chipped stone and it is also strongly concentrated in Stratum I. The material is present in the form of small well-rounded vein quartz cobbles and pebbles. The ultimate source of this stone has not been established, but it is common and widespread in bars and other alluvial deposits on the northwestern Olympic Peninsula. Thus, whether it represents bedrock quartz sources on the Olympic Peninsula or in British Columbia is not important. It is likely that the site's residents were collecting it locally.

Three other types of stone were recognized in the 45CA400 collection. All are present in only very small quantities and, collectively, the three types account for only about 9% of the chipped stone. Some of these consist of only a single type of rock; others are groups of rocks. The best represented type - - 'Other Volcanics' - - appears to include examples of rhyolite and andesite. Six examples of Cryptocrystalline Silicate (CCS) stone were collected. This group is also heterogeneous. It includes specimens that range from a dark gray-green stone that resembles Hozomeen Chert to material that is almost white. A few pieces of the cryptocrystalline silicate artifacts may have been heat-treated.

Nearly all of the raw materials represented in the 45CA400 chipped stone debitage were probably collected locally. By this, we mean within no more than 10 to 15 miles of the site. As noted above, some of these materials may have originally been transported here by Pleistocene glacial processes, but we believe that even these were probably collected locally.

5.1.2.1.1 Debitage

Chipped stone debitage is, by far, the most abundant type of prehistoric artifact encountered at 45CA400. Debitage accounts for 195 (approximately 95%) of the 206 pieces of chipped stone in the collection. This study made only a limited examination of the debitage collection. All chipped stone debitage was washed, carefully examined, and then characterized with respect to raw material and technological category. The analysis was performed by Jeff Horton. No effort was made to collect information about size, weight, or additional technological attributes.

Examination of the debitage from 45CA400 led to the conclusion that the overwhelming majority of these artifacts were the products of either one of two basic stone-working techniques: bi-polar percussion flaking and direct free-hand percussion flaking. Not only do these technologies produce different types of debitage, to a very large extent they were applied to different raw materials. Bi-polar percussion was applied almost exclusively to quartz; direct free-hand percussion was applied almost exclusively to the other types of rock. A third technology - - pressure flaking - - is also represented, but it is far less common than the previous two.

Bi-polar percussion is a technique which braces a cobble of raw material on another stone ('the anvil') and then strikes it from above with a third stone ('the hammer stone'). The technique has the potential to produce very straight flakes. Flenniken (1980) described a bi-polar industry focused on the use of small vein quartz cobbles at the Hoko River wet site [45CA213]. This industry produced small microliths which were hafted in wooden handles; replication studies suggest that such knives would have been effective for filleting fish. The quartz and quartz crystal bipolar debitage from 45CA400 appears to be indistinguishable from that reported by Flenniken at 45CA213. Thus, we have chosen to describe the bipolar debitage from 45CA400 using the same classification system Flenniken used for Hoko River. The classification employs the terms: Unsuccessful Core, Split Cobble Core, Exhausted Core, Non-Functional Microlith, Potentially-Functional Microlith, Miscellaneous Debitage, and Linear Shatter (Flenniken 1980:52-77). Potentially-Functional Microliths are the point of the exercise and Flenniken defined them on the basis of the 10 quartz microliths found actually mounted in wooden handles at Hoko River. Speaking of the latter, Flenniken (1980:77) says:

> *The Hoko River site microliths are small specialized flakes that are quite short (average of 10.5 mm in length) and have at least one margin, not necessarily a lateral margin, that is sharp. Functional attributes include not only length and sharpness, but also width and thickness which are important for hafting. Average width of 10 hafted microliths is 7.5 mm and thickness average is 1.7 mm.*

Thus, it is possible to argue that Potentially-Functional Microliths are really tools rather than debitage. However, since it is not possible to tell which - - if any - - of these objects were

actually used, all are considered to be debitage here. For the most part, Non-Functional Microliths and Linear Shatter are fragments of quartz significantly larger than this; Miscellaneous Debitage are fragments of quartz significantly smaller than this

In contrast, direct free-hand percussion is a technique in which the raw material is held in one hand and then is struck by a hammer stone held in the other. It is the dominant type of stone chipping used in this region. Direct free-hand percussion can be applied unifacially or bifacially and thus it can be used to make much more refined objects than bi-polar percussion. The process of making refined - - often bifacial - - chipped stone tools is sometimes described as a 'trajectory' extending from the initial cobble of raw material to the completed tool. Similar to the case with bi-polar reduction, the production of a tool by direct free-hand percussion produces relatively distinctive debitage at different 'stages' along the trajectory. This study has used a simple classification for direct free-hand percussion debitage that considers the extent of cortex remaining on a flake. We use the terms: Primary Flake, Secondary Flake, Interior Flake, Flake Fragment, and Shatter. Primary and Secondary Flakes are decortication flakes; they are produced during the early stages in the trajectory and are sometimes referred to as 'cobble-reduction flakes'. Primary flakes are flakes whose dorsal surfaces are completely covered with cortex. Secondary flakes are flakes whose dorsal surfaces are only partially covered with cortex. Shatter (i.e., irregular blocky chunks of rock) are also often associated with the early stages in the trajectory. Pieces of shatter are not actually flakes and the presence and/or extent of cortex on them is not relevant to this classification. Alternatively, Interior Flakes are produced later in the manufacturing trajectory. They lack cortex and are associated with completing the tool-making process and with the maintenance of tools after they have been produced. Finally, Flake Fragments are pieces of broken flakes that are too small to assign to another category. These objects cannot be placed within the manufacturing trajectory and they are of little interpretive value.

Finally, pressure flaking is a technology where a flaking tool is placed against the edge of a piece of stone and then pressure is applied to that point in order to remove a flake. In a very real sense, Pressure Flakes are 'pressed off' rather than struck. Pressure Flakes are produced late in the manufacturing trajectory; they lack cortex and are associated with completing the tool-making process and with the maintenance of tools after they have been produced. As such Pressure Flakes are essentially a special type of Interior Flake.

A summary of the raw materials and technological types represented in the chipped stone debitage from 45CA400 is presented in Table 7.

The values in Table 7 reflect many of the characteristics of the debitage from 45CA400. First, note that the table indicates the relative importance of the two most prominent flaking techniques. Overall, objects associated with direct free-hand percussion outnumber those associated with bi-polar percussion by a ratio of almost 3:1. The near total absence of pressure flakes is also clear. (We are confident that pressure flaking was much less important than the former two techniques, but it should be noted that it is under-represented in our sample. While

only a single pressure flake was recovered in the excavation, pressure flaking is also evident on the margins of some of the bifacial tools in the collection.) The table also reflects the patterns in raw material use noted earlier. The vast majority of all bi-polar objects are made of quartz. Alternatively, there are no examples of direct free-hand percussion objects made of this material. Finally, note that Table 7 provides useful summaries of the character of the individual strata assemblages. We can see that evidence of bi-polar technology was encountered in four of the 10 cultural strata, and that it is heavily concentrated in Stratum I. Evidence of direct free-hand is more widely distributed in the site. Considering the latter directly, objects representing the early portion of the tool manufacturing trajectory (i.e., Primary and Secondary Flakes) are somewhat more abundant than objects representing the later portion of the tool manufacturing trajectory (i.e., Interior Flakes), but both are relatively common.

TABLE 7 SUMMARY OF THE DISTRIBUTION OF CHIPPED STONE DEBITAGE, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

Stratum	Material[1]	Cores				Bi-polar percussion[3]				Free-hand percussion[4]					Pressure
		SC	BP	EX	UN	PFM	NFM	LS	MD	PF	SF	IF	FF	SH	
I	1	-	8	3	2	6	8	-	16	2	3	-	-	-	-
	3	1	-	1	-	-	-	-	-	3	7	5	2	4	-
	6	-	-	-	-	-	-	-	-	-	-	-	66	-	-
	9	-	-	-	-	-	-	-	2	-	-	-	-	-	-
II	3	-	-	1	-	-	-	-	-	-	2	1	-	-	-
	9	-	-	1	-	-	-	-	-	-	1	-	-	1	-
	11	1	-	-	-	-	-	-	-	-	-	-	-	-	-
III	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-
IV	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
V	3	1	-	1	-	-	-	-	-	-	-	2	-	-	-
VI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VII	3	-	-	-	-	-	-	-	-	-	-	1	-	6	-
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	1
	11	-	-	-	-	-	-	-	-	-	-	1	-	2	-
VIII	3	-	-	-	-	-	-	-	-	-	4	7	1	10	-
IX	3	-	-	-	-	-	-	-	-	-	5	1	1	-	-
X	3	-	-	-	-	-	-	-	-	-	1	-	1	-	-

1: Materials: 1=Quartz, 2=Quartz Crystal, 3=Basalt/Dacite, 4=Cryptocrystalline Silicate, 5=Metasediment, 6=Shale/Slate, 7=Sandstone, 8=Granite, 9=Quartzite, 10=Obsidian, 11=Other Volcanics, 12=Other;
2: Cores: BP=Bi-Polar, EXH=Exhausted, UN=Unsuccessful;
3: Bi-Polar Percussion: NFM=Non-Functional Microlith, LS=Linear Shatter, PFM=Potentially Functional Microlith, MD=Miscellaneous Debitage;
4: Free Hand Percussion: PF=Primary Flake, SF=Secondary Flake, IF=Interior Flake, FF=Flake Fragment, SH=Shatter

In sum, the chipped stone debitage assemblages from 45CA400 indicate that a significant amount of stone working was occurring at this site. The stone workers employed several different techniques and appear to have focused upon locally available materials. Most of the objects we encountered are associated with the initial stages of tool manufacture. There is only limited evidence of the maintenance and/or repair of stone tools once they had been made. The assemblages reflect stone working industries common to other 2,000 to 3,000 year old sites in the area, but not to those from more recent sites. We have already noted the strong similarity between the ca. 2,500 to 3,000 B.P. 45CA213 bi-polar industry and that from 45CA400. The former site also contains a significant direct percussion industry focused upon local materials

very much like 45CA400 (Croes 1995). Roughly contemporaneous deposits from 45CA3 (Wessen 2006a), 45CA201 (Wessen 1993), and 45CA420 (Wessen 2003b) also contain similar bi-polar and direct percussion industries. In contrast, more recent late prehistoric cultural deposits on the Makah Indian Reservation contain very little chipped stone debitage of any kind (Wessen 1990).

5.1.2.1.2 Formed Tools

The chipped stone artifact collection from 45CA400 contains relatively few examples of formed tools. We recovered a total of 11 such objects; nine from the excavation and two from our inspection of the site area just prior to the field school. Eight of the nine chipped stone formed tools recovered during the excavation represent Stratum I (see Table 5). Thus, the dominance of chipped stone in Stratum I is also evident in this group. Typically, formed tools are present in very low frequencies relative to the debitage totals for the same site. This condition is clearly apparent in 45CA400 excavated sample, where the flake to tool ratio is 22:1. The 11 chipped stone formed tools from this site can be considered in several ways, and one of the more conspicuous characteristics of the group is that it includes five objects that do not appear to be finished tools. Rather, these objects are pieces of stone that have been shaped to some extent, but probably not completed. The six specimens that are finished tools represent three distinct classes tools: projectile points, bifacial knifes, and utilized flakes. The collection includes two examples of each class.

The two chipped stone projectile points were encountered on the surface of the site near its eastern end. Curiously, they were found within 1.5 meters of each other. Both specimens are moderate-sized stemmed points (see Figure 7). One is made of Basalt/Dacite and the other is a white Cryptocrystalline Silicate that may have been heat-treated prior to flaking. Both objects appear to have been made on flakes. Both have been shaped by direct free-hand percussion and then had their cutting edges finished by pressure flaking. These points are not actually too large to represent bows and arrows, but they are probably close to the maximum size for that association. As such, they could be used to infer the presence of either bows and arrows or atlatls. Similar projectile points have been reported at other ca. 3,000 year old shell midden deposits in this area (e.g., 45CA420), although they are uncommon. Chipped stone projectile points are extremely rare in the more recent late prehistoric deposits on the western Olympic Peninsula.

The four remaining chipped stone tools include two bifacial knifes, and two utilized flakes. The bifacial knives are both flakes that have been shaped into ovoid forms by deliberate free-hand percussion flaking along their margins (see Figure 8). One is made of a grainy low quality shale/slate and the other has been described as made from an ‘other volcanic’ material, possibly a rhyolite. These specimens were probably hand-held cutting and scraping tools. The two utilized flakes were also probably hand-held cutting and scraping tools, but they are much cruder objects. The latter are flakes that have a small working edge along one margin. The

Figure 7 Chipped stone projectile points from 45CA400, Makah Indian Reservation, Washington.

Figure 8 Chipped stone bifacial knifes from 45CA400, Makah Indian Reservation, Washington.

edges do not appear to have been prepared by deliberate flaking. Rather, a naturally sharp edge along the flake was utilized in an expedient manner and is now marked by what is probably use-wear. Similar ovoid bifacial knives and cruder utilized flakes have been recovered from most contemporaneous sites on the western Olympic Peninsula.

Five artifacts in this group can be described as bifacial preforms. These are objects that have been worked by direct percussion, but are still only roughly formed and unlikely to have been functional tools (see Figure 9). Most of the specimens are round to oblong in form and may be unfinished knives similar to the ovoid objects just described (see Figure 8). They are made of Basalt/Dacite or Other Volcanic materials. In contrast, one of the bifacial preforms is clearly lanceolate in form. This Basalt/Dacite artifact is well-formed, although very unlikely to be finished. It may have been intended to become a large lanceolate projectile point to be used with an atlatl dart or a hand-held spear. Alternatively, it could have been meant to be a hafted knife.

In sum, the chipped stone formed tool collection from 45CA400 is small, yet a number of different types of objects appear to be represented. It contains both finished tools and items that clearly are not finished tools. This suggests that stone tool manufacturing was occurring at the site, particularly during the interval represented by Stratum I. This interpretation is strongly supported by significant quantities of associated chipped stone debitage. Both tools that are - - or may be complete - - and unfinished objects whose intended functions we think we can infer, indicate that knives and other types of cutting and/or chopping tools were a dominant part of the stone tool inventory. (Recall that the small microliths considered to be the principal focus of the

Figure 9 Chipped stone bifacial preforms from 45CA400, Makah Indian Reservation, Washington.

bi-polar stone working industry are also thought to be associated with knives.) The stone tool assemblage contains at least two - - probably three - - objects that represent projectile points.

All of the objects considered here have analogs in the stone tool collections from the ca. 2,000 to 3,000 year old cultural deposits cited at the end of the discussion of 45CA400 debitage (see Section 5.1.1.1). Similarly, they are uncommon or wholly absent in recent late prehistoric cultural deposits on the Makah Indian Reservation.

5.1.2.2 Other Stone Artifacts

Our activities at 45CA400 also produced a collection of stone artifacts that are not chipped stone objects. While also scarce, such objects are somewhat more abundant than the chipped stone formed tools. A total of 19 specimens were recovered. Seventeen of the artifacts were encountered during the excavation, and two additional items were encountered during the inspection of the site area that preceded it. Most (15) of these items are ground stone artifacts; pieces of stone that have been purposely shaped by grinding and/or other abrasive techniques. Three are stones that have been modified from use, but not purposely shaped. The last specimen is unmodified, but clearly transported to the site area by people.

Figure 10 Other stone artifacts from 45CA400, Makah Indian Reservation, Washington. A – whetstone; B – hammerstone.

The most abundant artifact type in this group is the whetstone. Eleven specimens were recovered during the excavation. Seven of the latter represent Stratum I, but examples of whetstones were also encountered in four of the nine shell midden strata we sampled.

Whetstones are tabular fragments of relatively fine-grained sandstone that have a very polished surface on one or both of the tabular faces (see Figure 10A). The whetstone surfaces have not been examined under magnification, but at least one specimen may have a single shallow groove ground into its polished surface. Artifacts of this type are common in shell midden sites from this region (Draper 1989). They are hand-held grinding surfaces used to shape organic materials. Many types of bone tools and ground mussel shell tools are shaped and/or smoothed with these whetstones.

Four additional examples of ground stone artifacts are present in the collection, but all are at least somewhat problematic with respect to function. The uncertainties are due to conditions such as the fact that at least one of the specimens is fragmentary and that at least one or two others are probably not finished tools. One artifact is a broken piece of what appears to be a well-finished slate disk (see Figure 11A). It may be a fragment of a spindle whorl. Another is a small tabular fragment of fine-grained sandstone with a well-worn groove ground into one face (see Figure 11B). It may be a specialized type of whetstone. The last two members of this group are flakes of other volcanic stone that each have a polished area along a portion of their margin. One of the latter may be in an early stage of manufacture for use as an adze blade.

Three artifacts recovered during the excavation are hammerstones. These are small roller-shaped cobbles with evidence of crushing on one or both ends (see Figure 10B). Hammerstones are the tools that stoneworkers use to drive flakes in both the direct free-hand percussion and bi-polar percussion techniques described earlier (see Section 5.1.2.1.1).

Figure 11 Other stone artifacts from 45CA400, Makah Indian Reservation, Washington.
A – ground slate fragment; B – pebble with groove; C – fossil.

The last specimen in the other stone artifacts group is a small fossil. It was found prior to the field school excavation, in the western portion of the site area, exposed in a shell midden deposit that may be the equivalent of Stratum II. It is a piece of fine-grained sedimentary rock that represents a marine snail, very likely a moon snail [Naticidae] (see Figure 11C). We cannot say where this object originated, although we note that fossils are occasionally found along marine beaches on the northern Olympic Peninsula. We can, however, say that it is very unlikely that this is a naturally-occurring specimen that coincidentally happened to be present within the site area. Far more likely, it was found somewhere else in the region and transported to 45CA400 by one of the site's occupants. Fossils are extremely rare in Washington Coast shell middens, but this is not the first such example; a fossil *Clinocardium* shell has been reported from 45GH15 near Gray's Harbor (Roll 1974).

5.1.2.3 Bone, Antler, and Tooth Artifacts

The excavations at 45CA400 also produced a small sample of artifacts made from bone, antler, or tooth. In total we recovered 17 such objects. Ten of the 17 artifacts represent Stratum II and six of the other seven also come from shell midden deposits. No bone, antler, or tooth artifacts were encountered in Stratum I. We believe that most of these artifacts were made of terrestrial mammal bone, although this has not actually been demonstrated. The 17 specimens are considered to represent at least four classes of artifacts: small points, a wedge, a decorative item, and examples of worked bone.

The most abundant finished objects in the bone artifact collection from 45CA400 are small points (see Figure 12). A total of seven were recovered. Only two of the seven specimens are complete. Both are unipoints (i.e., small fragments of bone that have been sharpened to a point on one end). Both have flattened proximal ends that presumably facilitated hafting in some type of composite tool such as a fish hook or harpoon. All other bone points recovered from 45CA400 are broken objects whose complete form cannot be determined. Conceivably, they could represent more unipoints, bipoints, or needles. Small bipoints and unipoints are among the most common bone artifacts in western Washington shell midden deposits. Unlike the case with chipped stone tools, bone points do not appear to be chronologically sensitive. They are common to both relatively recent and older shell midden deposits.

Only two other finished objects are present in this group. One specimen is an antler wedge. This is a section of antler that has had one end ground to form a bevel (see Figure 13). Wedges made of antler or bone are woodworking tools. They are relatively common tools in western Washington shell midden deposits and come in a variety of shapes and sizes. As was the case with the bone points, they are not chronologically sensitive. The last finished object to consider from 45CA400 is a tooth that has had a small hole drilled through its root. The specimen is a fragment and identification of the tooth is uncertain, but it may be a sea otter (Enhydra lutris) molar. Given its fragmentary condition, identification of its function is also

problematic, but we suspect that it may represent a pendant or similar type of personal decorative item.

Figure 12 Bone points from 45CA400, Makah Indian Reservation, Washington. A – unipoints; B – point fragments.

Figure 13 Antler wedge from 45CA400, Makah Indian Reservation, Washington.

The last group of bone artifacts are pieces of worked bone. These are small fragments of bone which show evidence of shaping. They appear to be fragments of unfinished objects rather than broken fragments of finished tools. Given this condition, it is difficult to say what any of them were intended to be.

The small collection of bone artifacts from 45CA400 offers limited insights into cultural activity at the site, but a few observations can be made. The presence of pieces of worked bone that do not appear to represent finished tools indicates that bone tools were being produced at the site. The small points suggest that at least some of the site's occupants were fishermen and/or marine hunters. The antler wedge implies that woodworking was occurring there.

5.1.2.4 Shell Artifacts

The excavation at 45CA400 produced only three shell artifacts: two purple olive shell (*Olivella biplicata*) beads from Stratum II and a fragment of ground California mussel (*Mytilus Californianus*) shell.

The purple olive shell beads are complete purple olive shells whose apex has been cut off so that they can be strung (see Figure 14A). Purple olive shell beads have been recovered from a number of prehistoric sites in this region. For example, more than 50 purple olive shell beads were obtained from late prehistoric deposits at Ozette (Wessen 1982). Small numbers of olive

Figure 14 Shell artifacts from 45CA400, Makah Indian Reservation, Washington.
A - purple olive shell beads; B - ground mussel shell (possible pendant preform?)

shell beads have also been recovered from other older shell midden sites on the Makah Indian Reservation such as 45CA420 (Wessen 2003b) and 45CA3 (Wessen 2006a). They were traded widely and have occasionally been encountered in prehistoric sites in Eastern Washington (e.g., Campbell 1985). It is important to add that the Makah people have had a strong association with purple olive shell beads throughout the historic period and they continue to produce ornaments with purple olive shell beads at the present time.

The significance of the fragment of ground mussel shell is less clear. The specimen is a small disc-like object that has been ground along its margin (see Figure 14B). It may be an unfinished item (i.e., a piece of worked shell) and could have been intended for use as a pendant.

5.2 Fire-Cracked Rocks

Fire-cracked rocks are very common at 45CA400. While they are not tools, they are prehistoric artifacts. These objects are the bi-products of heating water, but they have not been purposefully shaped in any sense. Almost all of these rock fragments appear to be sedimentary materials. There have been some efforts to characterize different types of fire-cracked rocks (e.g., House and Smith 1975; Schalk and Meatte 1988; and Stanfill and Draper 1989), but no formal effort has been made to describe the present sample in these terms. Nevertheless, it can be stated that rocks exhibiting "contraction cracking" - - considered to be diagnostic of stone boiling - -are very common in the collection. Indeed, most specimens in the sample exhibit contraction cracked attributes.

Fire-cracked rocks were subject to no formal analyses other than noting their presence and frequency in terms of both piece count and weight. A summary of their frequency, by strata, is presented in Table 8. (Our knowledge of the fire-cracked rocks in this site has been slightly diminished due to the inadvertent loss of the documentation for these objects from Stratum VI. We can report that fire-cracked rocks are present in Stratum VI, but no quantitative data is available.) In total, a documented sample of 1,628 specimens weighing 123.7 kilograms (272.1 pounds) was recovered during the excavation. Stratum density values for the fire-cracked rocks were presented in Table 3.

TABLE 8 A SUMMARY OF FIRE-CRACKED ROCKS, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

	STRATUM									
	I	II	III	IV	V	VI	VII	VIII	IX	X
NISP	954	524	7	22	7	-	82	19	-	11
Weight (KGs)	84.1	31.3	0.2	0.9	1.8	-	2.4	1.0	-	1.4

This table, and the density values in Table 3, clearly indicate that fire-cracked rock is present in almost all of the cultural strata at 45CA400. The latter tables show two strata without fire-cracked rock: Strata VI and IX. As just noted, however, the apparent absence of these objects in Stratum VI reflects missing data; fire-cracked rocks were present here. In contrast, no fire-cracked rocks were encountered in Stratum IX. While present in most strata, there are dramatic difference in the frequency of their occurrence. Note that the materials representing Strata I and II account for more than 90% of the entire sample. The Stratum I assemblage is significantly larger than that from Stratum II, but - - when the represented volumes are considered - - the density of fire-cracked rock in Stratum II is actually far higher; 749 pieces per cubic meter as compared to 304 pieces per cubic meter in Stratum I. The Stratum II fire-cracked rock density is relatively high by regional standards, although significantly higher densities have been recorded.

Accepting an association between fire-cracked rocks and the heating of water, we conclude that heating water was a relatively common activity at the site. Fire-cracked rocks are a very common material found in shell midden sites throughout the region.

5.3 Faunal Remains

Faunal remains were the most abundant cultural materials recovered from 45CA400. The site contains materials representing a wide range of fauna including: shellfish, fish, mammals, birds, and - - possibly - - a reptile. Before considering each major group of materials, however, it is worthwhile to briefly consider the distribution of the samples. As with other archaeological materials, faunal remains were encountered in all 10 of the identified major strata and their stratigraphic distributions are summarized in Figure 15. This figure clearly reflects that shell is, by far, the most abundant faunal material in the site. Shell accounts for approximately 80% of all recovered faunal specimens, clearly dwarfing all classes of bone. Note also that the overwhelming majority of all the recovered shell represents Stratum II. A second large sample of shell was recovered from Stratum VII. These patterns are also clearly evident in the density values presented earlier in Table 3.

The degree of study directed toward faunal remains varied somewhat, but it is fair to say that each class of faunal materials received only limited descriptive investigation. The principal activity with each class was to identify, as far as was practical, all recovered faunal materials and to determine the relative frequency of each of the types of animals represented in each stratum. The resulting stratum assemblages were then used as a basis to make inferences about the environmental and seasonal focus of the hunting and collecting behavior of the site's occupants.

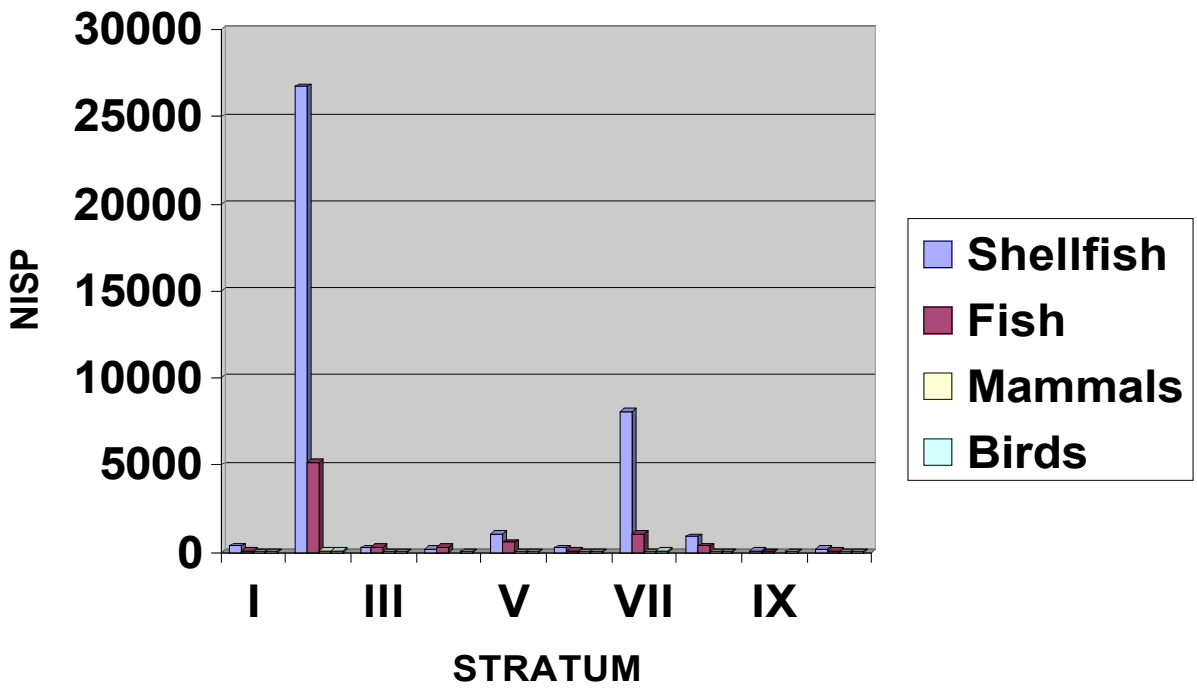

Figure 15 Distribution of faunal material NISP by strata, 45CA400, Makah Indian Reservation, Washington.

5.3.1 Marine Shell

Shellfish remains are, by far, the most abundant faunal materials represented at 45CA400. The total sample recovered during the investigation includes 38,028 pieces of identifiable bivalve, univalve, chiton, and other marine invertebrate remains[1] and 1.46 kilograms of barnacle shell and sea urchin test. All shellfish remains were cleaned, identified, and counted. Minimum Number of Individuals (MNI) estimates for different classes of shellfish were calculated in different ways; basically, after Wessen (1982). Bivalve shells were oriented and counted by side, but they were not sorted by size class. Complete univalves and univalve spires were counted. Chiton plates were oriented and counted by body position. Barnacle shell and sea urchin test was weighed, but not reported in terms of an MNI estimate. In total, the analysis indicates that the recovered

1 This count does not include the three shell specimens considered earlier in the discussion of shell artifacts.

samples represent a minimum of 31,380 animals. The shellfish analysis was conducted by the author with considerable assistance from the Anthropology Club at Pacific Lutheran University.

Shellfish remains were recovered from all 10 cultural strata, but slightly more than 70% of the entire sample represents the Stratum II assemblage (see Figure 15). The Stratum VII assemblage accounts for another 21% of the sample. Thus, all other shellfish assemblages are much smaller; those from Strata IV and IX are particularly small. In the case of Stratum I, we believe that at least some of the shell may actually have been re-worked from Strata II by burrowing animals or other mechanisms. The controlled recovery of shell samples by real depositional strata allowed for the calculation of shell densities for these strata and individual stratum shell density (NISP per cubic meter) values have already been reported in Table 3. These values indicate dramatic variation between the strata. While most of the shell midden strata have shell densities between approximately 700 and 2,200 pieces per cubic meter - - values that are common in this region - - the shell densities for Strata II and VII greatly exceed this range. Stratum II has a density of 38,182 pieces of shell per cubic meter. Stratum VII has a density of 9,485 pieces of shell per cubic meter. These values are much greater than the previously reported high for shell in a single stratum in western Washington: 7,285 pieces per cubic meter in Stratum VIII at 45CA201 (Wessen 1993). The very high density values for Strata II and VII at 45CA400 are due to the very large numbers of Sitka periwinkle (*Littorina Sitkana*) present in these deposits.

Minimum Number of Individuals estimates for the 45CA400 shellfish taxa, by strata, are presented in Table 9. The total sample includes at least 28 varieties of shellfish, but there is significant variation in stratum content. Individual stratum sample size probably accounts for some of this variation, but is unlikely to explain all of it. While the range of species present is typical to prehistoric shell middens on the western Olympic Peninsula, the character of individual stratum samples from this site differs from most other nearby sites. Typically, shell midden strata are dominated by bivalve remains. In this case, however, eight of the 10 strata are dominated by a univalve: the Sitka periwinkle. If periwinkles are removed from consideration, then bivalves dominate all stratum samples. Five bivalves are represented at the site and all are present in most stratum assemblages. Those that don't contain all five have small sample sizes. There is relatively little variation in the relative frequency of bivalves from one stratum to the next. Butter clams (*Saxidomus giganteus*) and horse clams (*Tresus* sp.) dominate nearly all strata assemblages. California mussels (*Mytilus Californianus*), steamer clams (*Protothaca staminea*), and basket cockles (*Clinocardium Nuttalli*) are also common, but significantly less abundant than the former two. California mussels dominate the Stratum VIII assemblage and steamer clams dominate Stratum IX, but both of the latter have small sample sizes. We have already noted the impressively high numbers of Sitka periwinkle in most strata and this animal is particularly prominent in Stratum II. The Stratum II periwinkles represent slightly more than half of the shellfish MNI for the entire 45CA400 sample. Other relatively well represented univalves include the frilled dogwhinkle (*Thais lamelosa*) and several species of limpets (*Acmea* spp.).

TABLE 9 A SUMMARY OF MINIMUM NUMBER OF INDIVIDUALS ESTIMATES AND WEIGHTS FOR SHELLFISH, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

		STRATUM				
Latin	**Common**	**I**	**II**	**III**	**IV**	**V**
Strongylocentrotus spp.	indet. sea urchin	-	6	-	9	-

Three varieties of chitons are present, but none are particularly common. The most commonly occurring chiton is the black katy (*Katharina tunicata*), with at least a single individual being recovered in nine of the 10 strata. At least one red rock crab (*Cancer productus*) and one sand dollar (*Dendraster excentricus*) are also present. Finally, a significant quantity of barnacle shell and sea urchin test was recovered. These last materials were not converted to MNI estimates, but it is clear that the represented animals were not abundant. Barnacle remains in the sample include examples of the acorn barnacles *Balanus balanus*, *Balanus cariosus*, and *Balanus nubilus*. Sea urchin remains include examples of the green sea urchin (*Strongylocentrotus drobachiensis*) and the purple sea urchin (*Strongylocentrotus purpuratus*).

Beyond the above-noted dominance of periwinkles, the shellfish assemblages from 45CA400 are somewhat unusual for prehistoric shell midden sites in this region. While all of these shellfish occur in most shell midden sites, their relative frequencies are unusual. Nearly all late prehistoric shell assemblages from Makah sites are dominated by shellfish from high energy rocky shorelines. Typically, California mussels, barnacles, limpets, and chitons are all very well represented. These animals are present at 45CA400, but they are relatively uncommon. Rather (and exclusive of the periwinkles), most 45CA400 strata are dominated by butter and horse clams that favor sandy to gravelly beaches and somewhat lower wave energy regimes. Thus, the shellfish collectors from 45CA400 appear to have spent much of their time working areas other than the high energy rocky shorelines common in the area today. This pattern is much like that seen in the ca. 3,000 year old shell midden deposits at 45CA420 (Wessen 2003) and in the roughly contemporaneous shell midden deposits at 45CA3 (Wessen 2006a). This suggests that a different suite of inter-tidal environments may have been present at that time.

All of the shellfish represented at 45CA400 are locally occurring animals. No exotic shellfish species were encountered. The overwhelming majority of all the shellfish remains are considered to represent residues of the human consumption of shellfish meat. Relatively large bivalves such as butter clams and horse clams were probably the most important food resources, but a wide variety of other shellfish were also consumed. To a much lesser extent, some of them could also represent fish bait and/or shellfish transported into the site area incidental to other activities.

The shellfish from 45CA400 were not subject to any direct study of seasonal collecting patterns, but it is possible to offer a few observations which may relate to seasonality. The first concerns the presence of large numbers of periwinkles. Makah elders report that periwinkles were usually collected during the spring (Wessen 1988). A second observation addresses the sizes of the bivalves. While the analysis did not collect data on bivalve size classes, it was obvious that there was little - - if any - - size class selectivity in the collection of the dominant bivalves. The butter clam, horse clam, and steamer clam samples all contained many individuals in most size classes. There is little suggestion that larger individuals were targeted for particular attention. This observation is relevant because there is data from ca. 300 to 400 year old

deposits at 45CA24 (Wessen 1988) which suggests that prehistoric Makahs exercised size class selection in harvesting of important bivalves during the summer months, but not during the winter. If the two aspects of traditional Makah shellfish use noted here are ancient patterns, then it may be that the shellfish assemblages represented in the 45CA400 deposits are the products of winter and spring time collecting.

5.3.2 Fish Bones

Fish bone was the most abundant type of bone encountered during the excavations at 45CA400. Fish bones were encountered in every cultural deposit we examined and we recovered a total sample of 6,850 specimens from the 1/4 inch screens. Another 1,123 specimens were recovered from 1/8 inch screening of the volumetric sediment samples. Fish bones were cleaned and identified, but variations in both the diagnostic character and condition of individual specimens made the level of taxonomic identification vary considerably. For these reasons, fish are considered in terms of Number of Identified Specimens (NISP) rather than MNI. While no MNI estimates will be offered, it is reasonable to suggest that this sample could represent more than 1,000 fish. The fish bone analysis was conducted by David Huelsbeck and Stefanie Midlock of Pacific Lutheran University.

As was the case with the shellfish remains, while fish bones were recovered from all cultural strata, there is dramatic variation in individual stratum assemblage size (see Figure 15). Consistent with the shellfish remains, well more than half (69%) of all recovered fish bones represent Stratum II. Another 13% of the fish bone sample represents Stratum VII. All other stratum fish bone assemblages are significantly smaller. The Stratum IX assemblage contains only two specimens. The (1/4 inch screen) density of fish bone in the 45CA400 strata have already been presented in Table 3 and differences in the sampled volumes representing each stratum result in densities that vary somewhat from the above-noted pattern. The density values reported in Table 3 indicate that some of the strata contain very high densities of fish bone. In particular, the Stratum II density of 6,746 fish bones per cubic meter is the highest (1/4 inch screen) density yet reported for the western Olympic Peninsula. It is substantially greater than the previous high value of 4,800 fish bones per cubic meter reported at 45CA201 near Sand Point (Wessen 1993). Values between 1,000 and 2,500 per cubic meter are common in deposits in the other older shell middens we have investigated in this region and several of 45CA400's strata fall within this range. In fact, the recovery of very small fish bones from the 1/8 inch screening yielded far higher densities than even the 6,746 fish bones per cubic meter cited above but, before considering these, it is useful to present the taxonomic character of the 1/4 inch screen sample.

Number of Identified Specimens totals for the 45CA400 (1/4 inch screen) fish taxa, by strata, are presented in Table 10. Note first that only about half of the total fish bone sample has been identified to taxa. Approximately 52% of the sample consists of ribs, spines, and fragments were judged to be unidentifiable and have been classified simply as "fish". Additionally, a small number (12) of the specimens probably are identifiable, but could not be identified with the

comparative collection available to us. Our knowledge of the fish assemblages thus relies on a smaller - - though still large - - sample of 3,260 fish bones. At least 12 varieties of fish are represented. Among the identified fish, greenling (*Hexagrammos sp.*) are by far the most abundant. Several species of greenling occur in the area and it is likely that more than one is present in the sample. Greenling are present in all assemblages - - other than Stratum IX - - and they dominate all but one of Strata (IV) they occur in. They are particularly abundant in Strata II, V, and VII. The second most abundant group of bones in the fish bone sample represent salmon (*Oncorhynchus spp*.). Six species of salmon are available and we are confident that at least two are present here. Some very large specimens undoubtedly represent king salmon (*Oncorhynchus tshawytscha*) and at least some of the moderate-sized bones probably represent silver salmon (*Oncorhynchus kisutch*). Salmon bones also occur in all strata other than Stratum IX. While the pattern is not strong, salmon tends to be relatively more common in the same deposits where greenling is more common; notably in Strata II and VII. The third most abundant fish group is herring (*Clupea pallasii*). Herring were recovered from all strata except IX and X. Given the very small size of these bones, the fact that 100s were recovered during the 1/4 inch screening is impressive and it suggested that far larger numbers of them are probably present. Herring will be addressed again below in the discussion of the samples recovered from the 1/8 inch screen. Also relatively well represented are: ling cod (*Ophidon elongateus*), rockfish (*Sebastes* spp.), sculpins (*Cottidae*) - - including cabezon (*Scorpaenichthys marmortus*) - - and small flatfish (Pleuronectiformes). Halibut (*Hippoglossus stenolepis*) bones were recovered, but are rare.

Additional information about the fish bone assemblage from 45CA400 comes from the sample recovered from the 1/8 inch screen. The 1/8 inch screen fish taxa, by strata, are presented in Table 11. This sample contains fish bones from all strata except Stratum I. At least seven varieties of fish are represented, all of which are also present in the collection obtained from the 1/4 inch screen. The principal insight from the 1/8 inch screening concerns the presence of herring. Recall that 561 herring bones - - representing eight of the 10 strata - - were recovered during the 1/4 inch screening, and this suggested significantly greater quantities were probably present. The 1/8 inch screening confirmed this view. Almost 95% of all bones recovered from the 1/8 inch screening represent herring. The 1/8 inch recovery produced samples of herring bones from nine of the 10 strata. When the 1/4 inch and 1/8 inch samples are compared, the distributions of herring bones are similar, but some small differences are evident. For example, the 1/4 inch screening recovered specimens from all strata except IX and X; the 1/8 inch screening recovered specimens from all strata except I. This difference is probably a sampling error reflecting the great differences in represented sample volumes for the two recovery techniques. It is also worth noting that, while both techniques suggest large quantities of herring bones in Stratum II, the 1/4 inch recovery suggests a second large presence in Stratum V that is not confirmed by the 1/8 inch recovery. We have no explanation for this latter condition. A final point worth noting concerns the herring bone densities indicated by the 1/8 inch screening. As anticipated, the herring bone densities at this site are very high. Stratum II has a herring bone

density of 419,000 per cubic meter. Strata III, IV, and VII all have herring bone densities in excess of 120,000 per cubic meter. While the Stratum II value is highest yet reported in this region, small fish bone densities close to 100,000 per cubic meter have been reported at other sites on the western Olympic Peninsula. For example, the herring bone density for Stratum II at 45CA420 is estimated to be approximately 100,000 per cubic meter (Wessen 2003b); the smelt bone density for Stratum III at 45CA23 is 96,000 per cubic meter (Wessen 2006b).

TABLE 10 A SUMMARY OF 1/4 INCH SCREEN FISH BONE TAXA, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

		STRATUM				
Latin	**Common**	**I**	**II**	**III**	**IV**	**V**

TABLE 11 A SUMMARY OF 1/8 INCH SCREEN FISH BONE TAXA, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

		STRATUM				
Latin	**Common**	**I**	**II**	**III**	**IV**	**V**

Insert excel table 10 and 11 on one page

All of the fish represented in the 45CA400 assemblages are often found in archaeological sites from this region and they are considered to represent residues of the human consumption of fish. Given both relative frequency and individual size, it can be argued that the most important food fish were probably herring and salmon, but it is also clear that a wide variety of other fish were also important.

For the most part, the fish assemblages appear to reflect a variety of inshore marine fishing activities. The herring, greenling, rockfish, sculpin, and small flatfish are all likely to have been taken in relatively shallow waters. The halibut and cod probably represent fishing in somewhat deeper water, but they represent only a very small portion of the sample. Fish like lingcod and cabezon may also reflect fishing in somewhat deeper water, although these fish move into shallower waters during the winter. It is difficult to draw any inferences from the salmon as we don't know whether these fish were taken from the ocean or from local streams. Many of these fish were probably taken with hook-and-line, although other fishing technologies such as netting or spearing in shallow water may also have been used.

The 45CA400 fish assemblage contains a mixture of seasonal signatures. The large quantities of herring bone suggest the period when herring spawn. In this area, that would be late winter to early spring. Fish like lingcod and cabezon may also represent fishing in the winter. Alternatively, halibut and cod are most likely to have been taken during the spring and summer months, although - - as noted - - these are relatively minor elements in the assemblage. The salmon could represent any season between late spring and the fall. Nearly all of the remaining fish are available year round and could be taken in any season. Thus, the fish assemblage suggests that fishing activities may have been conducted through much of the year.

5.3.3 Mammal Bones

In contrast to fish bones, the mammal bone sample from 45CA400 is relatively small. Mammal bones were encountered in eight of the 10 cultural stratum, but a total of only 155 pieces were recovered. A large majority of them are small fragments rather than complete bones. Mammal bones were cleaned and identified, but variations in both the diagnostic character and condition of individual specimens made the level of taxonomic identification variable. For these reasons, mammals are considered in terms of NISP rather than MNI. While no MNI estimates will be offered, it is reasonable to suggest that this sample represents at least 20 to 30 animals. The mammal bone analysis was conducted by David Huelsbeck and Jeni Morris of Pacific Lutheran University.

Mammal bone exhibited considerable variation in their frequency of occurrence among the sampled strata (see Figure 15). This pattern is consistent with that noted for all other classes of faunal materials. Approximately half of the entire mammal bone sample represents Stratum II and another 25% of the sample represents Stratum VII. In marked contrast, the Strata I, V, VI, and X assemblages are very small. These dramatic differences in individual stratum assemblage

size - - plus the relatively high percentage of unidentifiable bone (see below) - - makes intra-site comparisons difficult. The inter-stratum variation in mammal bone can also be seen in the densities of mammal bone presented in Table 3. The dominance of Strata II is very apparent in this table. Note, however, that the very small sampled volume of some strata results in relatively high density values even if the absolute size of the assemblage is small. For example, the Stratum III mammal bone density is close to that for Stratum VII (42 per cubic meter, as compared to 46 per cubic meter) even though the Stratum III assemblage size is much smaller. Overall, mammal bone densities at 45CA400 are modest by regional standards. The highest observed density at this site is 110 specimens per cubic meter in Stratum II. Mammal bone densities in excess of 1,000 per cubic meter are known at several sites on the western Olympic Peninsula. The highest mammal bone density we are aware of is the 1,227 specimens per cubic meter in Stratum II at 45CA23 (Wessen 2006b).

Number of Identified Specimens totals for the 45CA400 mammal taxa, by strata, are presented in Table 12. Consistent with the fish bone sample, a large portion of the mammal bone sample consists of fragments which could not be identified. In this case, "mammal" specimens represent 50% of the sample. Our knowledge of the details of the mammal assemblages, therefore, relies on a sample of 92 pieces of bone. Review of the latter group indicates that it is heavily dominated by marine mammals. Approximately 77% of all identified specimens represent marine mammals. Thus, bones representing marine mammals outnumber those from terrestrial mammals by a ratio of slightly more than 3:1. The most abundant, and only dominant, animal in the sample is the northern fur seal (*Callorhinus ursinus*). This despite the fact that fur seal bones were only recovered from four of the 10 strata. At least five other marine mammals are also represented, all of which are represented by only small numbers of bones. Harbor seal (*Phoca vitulina*), Steller's sea lion (*Eumetopias jubata*), and sea otter (*Enhydra lutris*) are all present. Porpoise bone may represent either the harbor porpoise (*Phocaena vomerina*) or the Dall porpoise (*Phocaenoides dalli*). Whale bone from the site probably represents either the gray whale (*Eochrichtius gibbosus*) or the humpback whale (*Megaptera novaeangliae*). The clear dominance of marine mammals among the identified specimens argues that most of the specimens assigned to the "mammal" group also represent marine mammals. Similarly, we suspect that fur seals are probably prominent in the "marine mammal" group.

The much smaller sample of terrestrial mammal bones is as diverse, but contains no clearly dominant animal. The most common animal in this group is a canid - - probably a domestic dog (*Canis familaris*) - - that is represented by only three specimens. Also present are one or two bone fragments representing each of three large mammal: deer (*Odocoileus hemionus*), elk (*Cervus Canadensis*), and black bear (*Ursus Americanus*) and two smaller mammals: beaver (*Castor Canadensis*) and raccoon (*Procyon lotor*). Finally, a small number of very fragmentary specimens have been assigned the "terrestrial mammal" group. Given the absence of a clearly dominant terrestrial animal, there is little basis to suggest what animals might be represented here. We suspect that additional examples of deer and/or elk bones are probably present, but this view

is based upon the widespread importance of these animal as food resources rather than any particular characteristics of the 45CA400 sample.

TABLE 12 A SUMMARY OF MAMMAL BONE TAXA, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

		STRATUM				
Latin	**Common**	**I**	**II**	**III**	**IV**	**V**

The 45CA400 mammal bone sample contains few surprises. All of the animals we report are commonly encountered in sites on the northwestern Olympic Peninsula. The dominance of marine mammals is typical of sites in this area, as is the dominance of fur seal among the marine mammals. The lack of one or more clearly dominant animals among the terrestrial animals is a little unusual, but may be nothing more than a product of the small sample size for this group. If a larger sample was available, we suspect that deer and/or elk would be more prominent.

A great majority of the mammals in the 45CA400 sample undoubtedly represent the residues of human consumption of these animals. Some of the bones may also have been used in the manufacture of bone tools. In particular, all of the marine mammals represented at the site were significant food resources for late prehistoric and early historic Makahs, and we suspect that they were equally important during the 45CA400 occupation. Among the terrestrial mammals, only the canid is unlikely to have been a food resource.

Finally, it should be noted that a great majority of the represented mammals in this sample are year-round residence of the area and could have been taken in any season. The principal exceptions to generalization are the fur seals and the whale. The latter are more seasonal in their availability. Further, hunting of these animals was probably influenced by both weather and sea conditions, thus making winter hunting unlikely. In the early historic period, hunting at sea was an activity that occurred largely during the spring and summer months. We suspect that this was also true during the period represented by the 45CA400 occupation.

5.3.4 Bird Bones

Bird bones are relatively common in the cultural deposits at 45CA400. In total, the recovered sample contains 253 specimens. While much less abundant than fish bones, they are significantly more common than mammal bones. As was the case with the mammals, a large majority of them are bone fragments rather than complete bones. Bird bones were cleaned and identified, but - - once again - - variations in both the diagnostic character and condition of individual specimens made the level of taxonomic identification variable. For these reasons, bird bones are considered in terms of NISP rather than MNI. While no individual MNI figures will be offered, it is reasonable to suggest that this sample probably represents at least 120 to 140 birds. The bird bone analysis was conducted by Rebecca Wigen of Pacific Identifications.

Bird bones were encountered in all 10 of the cultural strata we sampled and their frequency of occurrence paralleled that seen in the two previous bone samples (see Figure 15). In this case, approximately 38% of the bird bone was recovered from Stratum II and another 26% of the sample represents Stratum VII. In contrast, the Strata I, IV, VI, and X bird bone assemblages are very small. These dramatic differences in individual stratum assemblage size make intra-site comparisons difficult. The density of bird bone in the site's strata have already been presented in Table 3. The highest single stratum density - - 138 specimens per cubic meter in Stratum II - - is the highest value yet reported in this area, but it is only slightly greater than the

previous high of 135 per cubic meter in Stratum X at 45CA201. All other 45CA400 bird bone densities fall well within the range reported for other regional assemblages.

Number of Identified Specimens totals for the 45CA400 bird taxa, by strata, are presented in Table 12. The bird bone sample also contains unidentifiable specimens, but - - as compared to the other bone groups - - they are a relatively small part of the collection. Only 13% of the bird bone has been described simply as "bird". Overall, the assemblage is relatively diverse; the 253 specimens that can be identified represent at least 24 varieties of birds. The most abundant bird identified to species is the white wing scoter (*Melanitta fusca*) which accounts for approximately 28% of all identifiable bones. It is the dominant bird in both Strata II and VII. The second most abundant bird is the double-crested cormorant (*Phalacrocorax auritus*), but it is far less common. Well represented groups of birds include ducks (19% of all identifiable bones) and gulls (12%). The various birds in this sample can be thought of as representing several distinct environmental settings. The overwhelming majority (approximately 95%) of all identifiable bones represent nearshore marine birds. Scoters, ducks, gulls, cormorants, and loons are particularly prominent in this group. Alternatively, offshore marine birds such as the short-tailed albatross (*Phoebastria albatrus*) and the northern fulmar (*Fulmarus glacialis*) and terrestrial birds such as the bald eagle (*Haliaeetus leucocephalus*) and the raven (*Corvus corax*) are present, but only in very small numbers.

Overall, the 45CA400 bird sample shares much with bird bone samples from other sites on the northwestern Olympic Peninsula. All of the birds identified here have also been reported at other sites. The characteristics of the sample is also similar to some other nearby sites. In particular, the dominance of white wing scoters and other nearshore marine birds is also seen in roughly contemporaneous bird bone samples from 45CA3 and 45CA420. This pattern is in some contrast to the roughly contemporaneous bird bone sample from 45CA201 and the more recent sample from 45CA24, which are dominated by offshore marine birds.

Nearly all of the birds in the 45CA400 sample probably represent the residues of human consumption of these animals. The only birds unlikely to have been food resources are the few terrestrial birds such as the bald eagle, the hawk, and the raven. Despite their frequency, however, none of these birds represent large quantities of food and we suspect that birds were a relatively minor resource - - as compared to fish and mammals. The bird sample from this site also indicates that birds may have been taken throughout much of the year. Approximately 60% of the identified bones represent birds that are present year round. Another 35% represent birds that could only have been taken during the fall, winter, or spring. Exclusively summertime birds account for only about 5% of the sample.

TABLE 13 A SUMMARY OF BIRD BONE TAXA, BY STRATA, 45CA400, MAKAH INDIAN RESERVATION, WASHINGTON.

		STRATUM				
Latin	**Common**	**I**	**II**	**III**	**IV**	**V**
Phoebastria albatrus	short-tailed abatross	-	3	1	-	-
	indet. bird	-	8	1	2	2

5.4 A Possible Reptile Bone?

Finally, the 2005 test excavation produced a single small fragment of bone unlike any other specimen in the sample. The fragment was recovered from Stratum II and appears to be a piece of a small turtle carapace. If this identification is correct, then this is the first example of turtle bone to be found in a prehistoric shell midden deposit on the western Olympic Peninsula. Given its condition, this identification should be considered provisional, but we think that it is likely enough to be considered here. If the identification is correct, we believe that the specimen probably represents a terrestrial, rather than marine, animal. Turtles are uncommon in Washington, but they do occur. The most likely candidate is the Pacific pond turtle (*Clemmys marmorata*).

The presence of turtle bone in a shell midden deposit is sufficiently unusual that it is difficult to draw many behavioral inferences from it. While turtles are edible, we think it unlikely that this specimen represents a food resource. If it does represent food, it is clear that turtles were a very minor and incidental resource. It is also possible that the fragment of bone represents the use of a turtle in the manufacture of an artifact. Rattles made of turtle bone were used in some portions of North American and it is at least possible that this could be the case here. We can offer no seasonal inference beyond the suggestion that turtles were unlikely to have been collected during the winter.

6.0 DISCUSSION AND CONCLUSIONS

The testing and evaluation activities described in this report have focused upon a small portion of the 45CA400 site area. The Research Design which directed the work identified a number of specific questions about the cultural behaviors represented in the site (see Chapter 3) and it is therefore appropriate that this report conclude with some discussion of what can now be said in response to these questions. Since our ability to address the questions is structured by our appreciation of what the deposits actually represent, the final chapter of this report will first summarize what we think the excavated deposits represent, consider what types of cultural behaviors seem to be indicated, and then address the cultural and environmental landscape. The report will conclude with some final thoughts about the significance and probable National Register eligibility of 45CA400.

6.1 Interpreting the Excavated Area

The area addressed by this study is only a small portion of the 45CA400 site area, as we see it today. In this regard, it is important to recall that the site area is quite large and that our limited investigations of the rest of the site suggests that it is internally complex. Indeed, even the area where our test pit is located is internally complex. Thus, discussions in this chapter refer to the excavation area and its immediate vicinity. Judgments regarding how representative this area is will have to await further study of the site. We believe that the area we sampled contains three distinct cultural components: a historic and a later prehistoric component are represented in Stratum I and an earlier prehistoric component is represented in Strata II through XI. There is no evidence of an occupation hiatus between the two prehistoric components, but we suspect that there was a considerable interval between the end of the later prehistoric component and the historic occupation at the site.

It is difficult to say much about the context of either the historic component or the later prehistoric component. The Stratum I matrix appears to be a forest soil. On the basis of material culture, we believe that the historic occupation was probably brief. We suspect that a structure was present, but have no in situ features that clearly reflect it (see Section 6.2.1). We know that the later prehistoric component began around 2,900 B. P., but we don't know how long these cultural activities lasted. The fact that its material culture is dominated by bi-polar percussion quartz debitage - - a technology not seen in local sites less than 1,000 years old - - argues that it did not persist into the last millennium. In this regard, we note that there are no clearly established surfaces within Stratum I, nor is there a culturally-sterile natural forest soil developed on top of it. The first of these observations - - the absence of established surfaces within Stratum I - - may be an indication that these components were relatively low intensity

occupations. Alternatively, it could be an indication that the Stratum I deposit has been disturbed and that a surface or surfaces within it no longer survive. The second of these observations - - the absence of a culturally-sterile natural forest soil above the cultural deposit - - may be an indication that one of the represented occupations lasted until the relatively recent past, or it could be additional evidence that the Stratum I deposit has been disturbed. In fact, several different lines of evidence argue that at least a portion of the Stratum I deposit has been disturbed.

The earlier prehistoric component is more complex and is represented by much larger quantities of material. It may also represent a significantly longer interval of time, although additional dates will be required to establish this. The available radiocarbon dates are not consistent on this matter. While three different radiocarbon dates place the end of this occupation at ca. 2,900 years B. P., two samples thought to represent the beginning of the occupation in the immediate vicinity of our test pit returned age estimates of ca. 3,170 and 3,780 years B. P. A sample thought to represent the earliest occupation at the eastern end of the site (that may or may not also represent this component) returned an even earlier age of ca. 4,380 years B. P. Similar to the later prehistoric component, there is no clear evidence of structures and all of the earlier component strata appear to represent exterior deposits. The 10 strata that comprise the earlier prehistoric component exhibit some significant differences in content and these differences probably reflect different types of cultural activities. Having said this, we acknowledge that our samples are probably too small to suggest a specific model for such changes within the earlier component interval.

Summary discussion of the excavated area should also address the condition of this area. In this regard, we have already noted that there is good reason to believe that at least a portion of the Stratum I deposit has been disturbed. More than one type of disturbance is probably involved. For example, we know that the site area has been logged twice. We also know that the Stratum I and II deposits are marked by several small linear features, some of which appear to be root casts and/or rodent burrows. The case for disturbance to the lower deposits is more limited. Some of the linear features do extend deeper, but they are quite localized and we have no direct evidence that they penetrate lower than Stratum VII. The depth of disturbance associated with historic logging has not been established, but we believe that it was probably limited to Stratum I. Indeed, the boundary between Strata I and II is largely intact. In sum then, while the portion of the 45CA400 site area that we examine is not in pristine condition, disturbance appears to be limited largely to the upper portion of the cultural deposits. In particular, disturbance to deposits beneath those affected by historic logging appears to be both limited and localized. Most of the cultural deposits in this portion of 45CA400 appear to be in relatively good condition.

6.2 Past Cultural Behaviors at 45CA400

The materials recovered from 45CA400 give us many important insights into the cultural activities which occurred at this site. Since we have chosen to consider the deposits in terms of three distinct cultural components, it is useful to offer separate reconstructions of the behaviors for each component.

6.2.1 The Historic Component

The presence of a historic component at 45CA400 came as something of a surprise and relatively little is known about it. The recovered assemblage representing the component is meager. It contains only six objects, three of which are nails. Two of the remaining three objects appear to be associated with a stove or fireplace. The last specimen is a moderate-sized glass bottle; it is not obviously a beverage container and its specific significance is uncertain. (While not collected, a piece of a small cast iron stove observed on the site's surface approximately 6 meters from the test pit should probably also be associated with this component). Only some of these artifacts are chronologically-sensitive. Those which are - - the nails and the bottle - - are unlikely to date prior to the early 20th Century.

This very small sample of materials allows us to suggest the presence of a wooden structure and a stove. The paucity of materials suggests that the inferred occupation was small and/or brief. While we cannot dismiss the possibility that some type of domestic occupation is represented, there are no unequivocally domestic objects in this collection nor do we know of any archival or oral-historical information suggesting a residence anywhere in this area. The vicinity of 45CA400 was first logged sometime during the late 1920s or 1930s and we suspect that the historic component at the site is associated with that activity. Finally, it is tempting to suggest that some of the vertical truncations observed in Stratum II may be related to the inferred historic structure. While this possibility cannot be dismissed, we do not think that it is likely. The truncations are apparent at depths of greater than 1 meter, yet most historic materials were encountered between 10 and 30 centimeters and none were found below 40 centimeters. Given the apparently ephemeral character of the historic occupation, we doubt that the inferred structure would have disturbed the ground this deeply.

6.2.2 The Later Prehistoric Component

Our reconstruction of the past cultural behaviors associated with the later prehistoric component at 45CA400 suggests a relatively limited range of low-intensity activities. The principal activities appear to be related to fishing. Some use of mammals, birds and shellfish is also indicated, but most hunting and collecting activities appear to have been relatively unfocused. There are no really dominant prey species other than greenling among the fish. The

heating of water (i.e., cooking?) occurred, as indicated by the fire-cracked rock, and this appears to have been a relatively important activity. The only manufacturing activities represented are the chipped stone industries. Of these, bi-polar percussion was the most dominate. The bi-polar percussion industry at 45CA400 appears to be indistinguishable from that reported at the Hoko River wet site (Flenniken 1980) where the latter is associated with small knives thought to have been used to butcher fish. Such an interpretation is equally plausible here. Direct percussion stone working is also well represented in the later component and the production of knives seems to have been a major focus of this technology as well. Thus, it may be that the later prehistoric component at 45CA400 represents a period when the site area was a small camp located along the lower Wa'atch River. Fishing may well have been the dominant activity, but surely other types of hunting and gathering efforts were also conducted from there. Unfortunately, nearly all of the seasonal inferences obtained by this study do not employ Stratum I materials and thus it is difficult to say much about the season represented by the later prehistoric component. We can suggest that the intensity of occupation seems too low to represent the winter, but this is only an impression.

6.2.3 The Earlier Prehistoric Component

The earlier prehistoric component at 45CA400 contrasts sharply with the latter. It is larger, internally more complex, and the much greater densities of cultural materials implies a much greater intensity of activity. The larger sample available to us also reflects a relatively wide range of cultural activities. For example, the earlier prehistoric component contains a far wider range of animal remains with some suggestion of a relatively intensive focus on some species. Marine mammals, nearshore marine fish, and several varieties of shellfish appear to have been particular targets of attention. (This finding suggests that the site was closer to the ocean during the interval represented by the earlier prehistoric component.) The earlier component occupants also appear to have engaged in a wider range of technological activities. Stone chipping - - though with bi-polar percussion much reduced - - stone grinding, the production of bone tools, and the use of bone tools are all evident. Finally, a few artifacts from the earlier prehistoric component also hint at still broader activities and contacts. The component sample may contain as many as four decorative items (i.e., the purple olive shell beads, the ground mussel shell, and the drilled sea otter molar). The presence of the fossil moon snail should also be noted in this regard. The faunal assemblages associated with the earlier prehistoric component offer several different lines of argument suggesting that it represents a multi-season, to possibly even year round, occupation.

While the considerably larger sample from the earlier prehistoric component provides a much stronger basis for reconstructions, the sample size available is still relatively small. Nevertheless, the contrast between this component and the later prehistoric one is quite clear. If we are correct that the earlier component represents a more diversified multi-season occupation, then this component may represent a settlement which is at least broadly analogous to the winter villages occupied by Makah People in early historic times. The present study has not sought to

establish the antiquity of Makah land use strategies but, since they appear to have some antiquity, an occupation very much like an early historic Makah winter village may be indicated by the early prehistoric component at 45CA400. Such an interpretation has other implications about what may be represented at the site. While we have no clear direct evidence of structures, we think that a diverse multi-season occupation implies the presence of some type of residential structures. This line of thought does not require that such residential structures were split cedar plank longhouses similar to those known to be present during the late prehistoric and early historic periods, but we would guess that this is also likely.

6.3 Environmental and Cultural Landscapes

While the focus of this study has been on documenting the structure and contents of a portion of the site 45CA400, the findings of our efforts offer insights into the broader contexts of the site. This information helps us to understand the landscapes that the represented occupations are associated with and their relationships to nearby sites. In fact, our appreciation of these issues is still quite limited, but a few observations can be made.

At the beginning of our work with this site, we suspected that at least one of the represented occupations was associated with a higher than modern sea level stand. Data from the earlier prehistoric component at 45CA400 supports this view. Both the site's location in the landscape and some aspects of the recovered faunal materials (e.g., a shellfish assemblage dominated by clams that favor sandy to gravelly beaches and lower wave energy regimes) are consistent with the idea that at least some of the lower Wa'atch Valley was inundated by sea water during the earlier prehistoric component occupation. Rather than being in a coastal river valley, the site appears to have been located on or close to a marine beach in a relatively protected bay or channel. Our data suggests that the higher sea level stand was present by ca. 4,400 years B. P., and that it persisted until at least ca. 2,900 years B. P[2]. In contrast, the later prehistoric component does not appear to be associated with this bay or channel. The limited data available for the later component appears to suggest an environmental setting much more like the modern condition.

The dynamics of the change in the lower Wa'atch Valley are not understood at this time, but there would appear to be at least three types of mechanisms that could account for the disappearance of a marine beach near the site: filling of the bay or channel by delta progration, a seismic event that uplifted the landscape, or a tectonic process that uplifted the landscape.

[2] Data from other paleoshoreline sites on the northwestern Olympic Peninsula suggests that this higher than modern sea level stand may have persisted until as late as ca. 1,600 to 1,800 years B.P.

These three mechanisms are not mutually exclusive and it is certainly possible that the observed change was produced by a combination of effects. In this regard, we note that while delta progration could have filled some of the lower Wa'atch Valley, this process would not account for the elevation of 45CA400 and the other nearby paleoshoreline sites. All of the latter occur on surfaces that are between 15 and 40 feet above sea level. This suggests that some type of uplift must have been involved. A seismic driven uplift would have been abrupt; a tectonic driven uplifted would have been gradual. In fact, the transition between the earlier and later prehistoric occupations appears to have been abrupt at 45CA3, 45CA400, and 45CA420, and thus a seismic event may be indicated.

The cultural evidence at 45CA400 is much like that reported for several nearby contemporaneous sites. Both the types of artifacts and faunal materials, and the structure of a buried mass of shell midden deposits overlain by a deposit that is rich in chipped stone while containing little or no shell, has now been seen at several of these sites. 45CA420, in the Tsoo-yess Valley just to the south, contains materials and structure very much like 45CA400 (Wessen 2003b). Data from 45CA3 - - located almost directly across the Wa'atch Valley from 45CA400 - - suggests that this site is also very similar. These, and other nearby contemporaneous sites are providing an increasingly strong case for the argument that a sophisticated maritime culture was well established in this area by ca. 3,000 to 4,000 years ago. While this early maritime culture exhibits some differences from that of the late prehistoric and early historic Makah People, such difference are small and strong elements of economic and technological continuity are apparent over the last 3,000 to 4,000 years.

6.4 National Register Eligibility

We find that the archaeological site 45CA400 is an important cultural resource and believe that it is eligible for listing with the National Register of Historic Places under Criterion D. That is, that the site "has yielded, or may be likely to yield, information important in prehistory or history". The limited work undertaken at the site so far suggests that a significant amount of intact prehistoric cultural deposits could be present. While the considerable internal variability we have observed makes estimating its volume difficult, if the data obtained from our soil auger probing is at least broadly accurate, more than 2,500 cubic meters of cultural deposits could be present. The deposits we examined are internally complex and most appear to be in good condition. Our testing shows that at least two distinct prehistoric cultural components are present. The earlier of these two components appears to represent a relatively large, diverse, multi-season occupation. All of the cultural deposits are rich in cultural materials and our analysis of them has provided a number of valuable insights into the types of activities which occurred here. As such, we believe that 45CA400 has already met the "has yielded" standard for eligibility.

This fact notwithstanding, we also believe that the potential of 45CA400 to yield still more important information is huge. This potential is manifest in a number of ways. First, the

sample already available to us still retains the potential to support further studies of the site occupant's economic and technological activities. Moreover, further excavations at the site will surely expand the range of materials available for study. In this context, we note that our test pit did not actually reach the earliest cultural deposits in the excavation area and much about the beginning of the 45CA400 occupation remains unknown. It is also important to add that cultural deposits at the eastern end of the site appear to be very different from those we sampled and we have very little information about that area. Even the western half of the site - - where we did work - - is only poorly known. Given the considerable variation in deposits in the western half of the site, the structural evidence we observed, and the evidence for fall, winter, and spring resources here, we suspect that further excavations at 45CA400 will expose indications of one or more residential structures at the site. Further appreciation of the materials preserved at 45CA400 will also add important details to our knowledge of older Makah sites and cultural adaptations. This is particularly true within the context of the expanding database of information from other older Makah sites. The 45CA400 occupation is clearly related to those represented at 45CA3, 45CA201, 45CA213, and 45CA420. Integration of these related site samples offers a significant opportunity to investigate older land use patterns in ways that are not possible with only a single site sample. Finally, some comment should be offered about the site's potential to provide environmental information. This aspect of the site has received only limited attention so far, and it is another important part of its significance. Specifically, we believe that faunal remains and other materials at 45CA400 can provide important new insights into the northwestern Olympic Peninsula's sea level history and to other types of environmental change associated with that history.

In sum, 45CA400 is an important cultural resource worthy of protection and recognition. The limited studies undertaken to date have already yielded many important insights and it is clear that further study of it will substantially add to what we have already learned.

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APPENDIX A

Radiocarbon Calibration Worksheets For Charcoal Samples From 45CA400

BETA ANALYTIC INC.

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REPORT OF RADIOCARBON DATING ANALYSES

FOR: Dr. Gary Wessen
Wessen and Associates

DATE RECEIVED: March 6, 1995
DATE REPORTED: March 28, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-80923	2690 +/- 60 BP	-25.0* o/oo	2690 +/- 60* BP

SAMPLE #: 45CA400-1
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

BETA

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REPORT OF RADIOCARBON DATING ANALYSES

Dr. Gary C. Wessen

Report Date: 2/4/2005

Wessen & Associates, Inc.

Material Received: 1/11/2005

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 200361	4150 +/- 70 BP	-0.3 o/oo	4560 +/- 80 BP
SAMPLE : 45CA1/BOM			
ANALYSIS : Radiometric-Standard delivery			
MATERIAL/PRETREATMENT : (shell): acid etch			
2 SIGMA CALIBRATION : Cal BC 2490 to 2050 (Cal BP 4440 to 4000)			
Beta - 200362	3360 +/- 70 BP	-0.1 o/oo	3780 +/- 70 BP
SAMPLE : 45CA400/BOM			
ANALYSIS : Radiometric-Standard delivery			
MATERIAL/PRETREATMENT : (shell): acid etch			
2 SIGMA CALIBRATION : Cal BC 1450 to 1120 (Cal BP 3400 to 3070)			
Beta - 200363	2900 +/- 100 BP	-25.0 o/oo	2900 +/- 100 BP
SAMPLE : 45CA400/TOM			
ANALYSIS : Radiometric-Standard delivery (with extended counting)			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 1390 to 830 (Cal BP 3340 to 2780)			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-0.1:Delta-R=390±25:Glob res=-200 to 500:lab. mult=1)

Laboratory number: **Beta-200362**

Conventional radiocarbon age: **3780±70 BP**

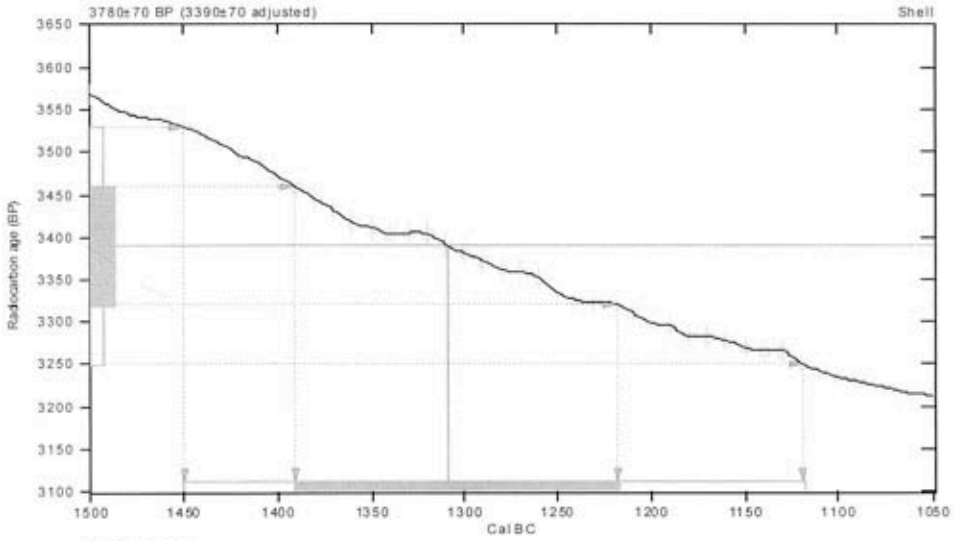
(3390±70 adjusted for local reservoir correction)

2 Sigma calibrated result: (95% probability) **Cal BC 1450 to 1120 (Cal BP 3400 to 3070)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1310 (Cal BP 3260)

1 Sigma calibrated result: (68% probability) Cal BC 1390 to 1220 (Cal BP 3340 to 3170)



References:

Database used

MARINE98

Calibration Database

Editorial Comment

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INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

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A Simplified Approach to Calibrating C14 Dates

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-200363**

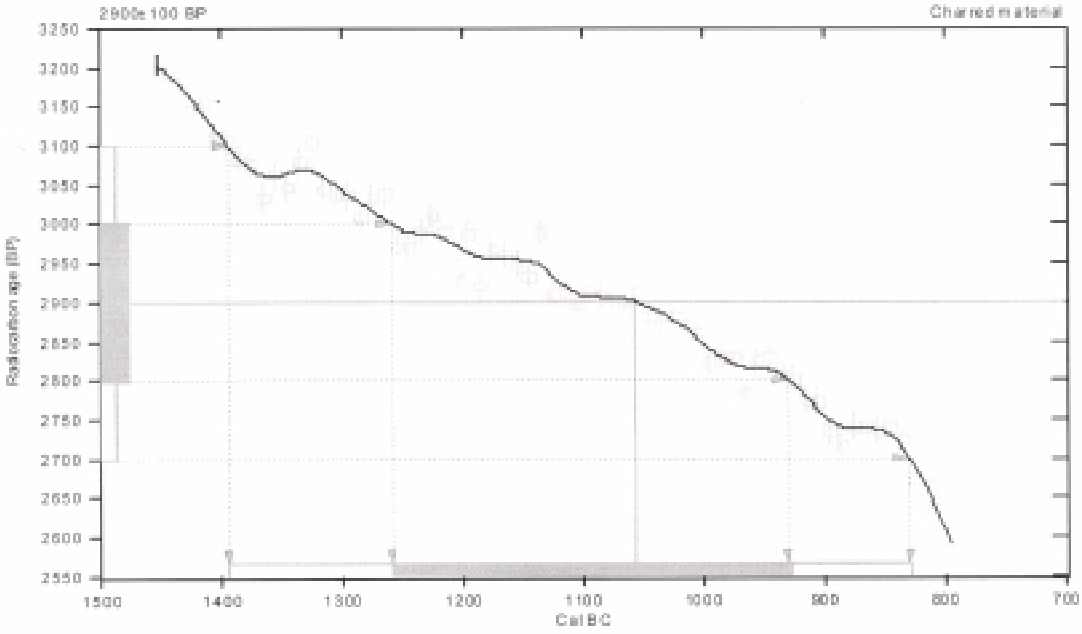
Conventional radiocarbon age: **2900±100 BP**

2 Sigma calibrated result: **Cal BC 1390 to 830 (Cal BP 3340 to 2780)**
(95% probability)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1060 (Cal BP 3000)

1 Sigma calibrated result: Cal BC 1260 to 930 (Cal BP 3210 to 2880)
(68% probability)



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REPORT OF RADIOCARBON DATING ANALYSES

Dr. Gary C. Wessen

Report Date: 8/17/2005

Wessen & Associates, Inc.

Material Received: 7/25/2005

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 206985	3170 +/- 40 BP	-25.2 o/oo	3170 +/- 40 BP
SAMPLE : 45CA400P1XII			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 1520 to 1390 (Cal BP 3460 to 3340)			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.2:lab. mult=1)

Laboratory number: **Beta-206985**

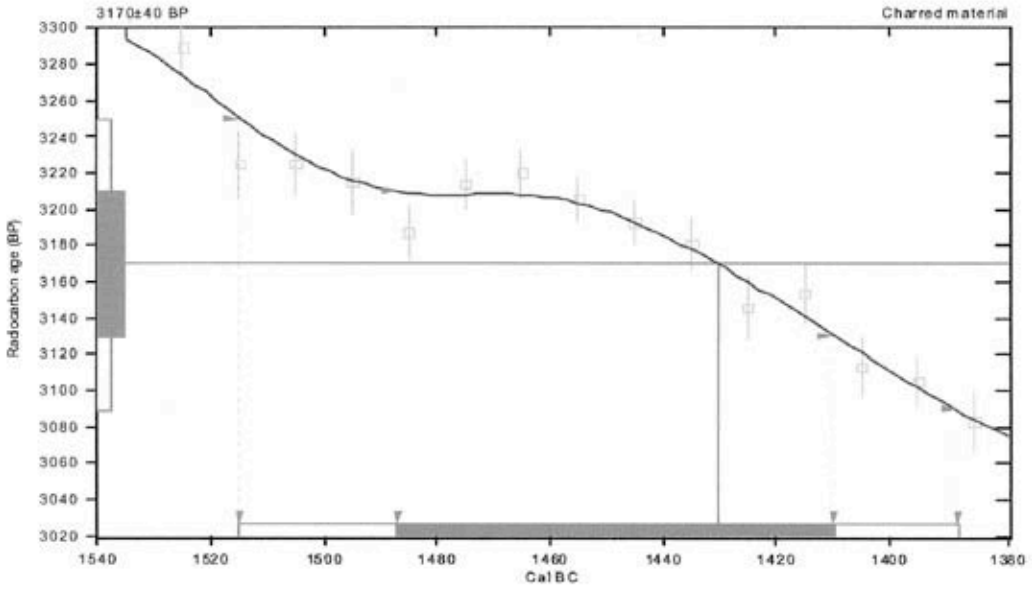
Conventional radiocarbon age: **3170±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 1520 to 1390 (Cal BP 3460 to 3340)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1430 (Cal BP 3380)

1 Sigma calibrated result: (68% probability) Cal BC 1490 to 1410 (Cal BP 3440 to 3360)



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REPORT OF RADIOCARBON DATING ANALYSES

Dr. Gary C. Wessen

Report Date: 10/20/2005

Wessen & Associates, Inc.

Material Received: 9/29/2005

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 209058	2870 +/- 70 BP	-26.3 o/oo	2850 +/- 70 BP
SAMPLE : 45CA400P1I89			
ANALYSIS : Radiometric-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 1250 to 830 (Cal BP 3200 to 2780)			
Beta - 209059	2990 +/- 60 BP	-23.0 o/oo	3020 +/- 60 BP
SAMPLE : 45CA400P1B57			
ANALYSIS : Radiometric-Standard delivery			
MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 1410 to 1060 (Cal BP 3360 to 3000)			
Beta - 209060	3980 +/- 70 BP	-0.8 o/oo	4380 +/- 70 BP
SAMPLE : 45CA400RA1			
ANALYSIS : Radiometric-Standard delivery			
MATERIAL/PRETREATMENT : (shell): acid etch			
2 SIGMA CALIBRATION : Cal BC 2230 to 1870 (Cal BP 4180 to 3820)			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By international convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.3:lab. mult=1)

Laboratory number: **Beta-209058**

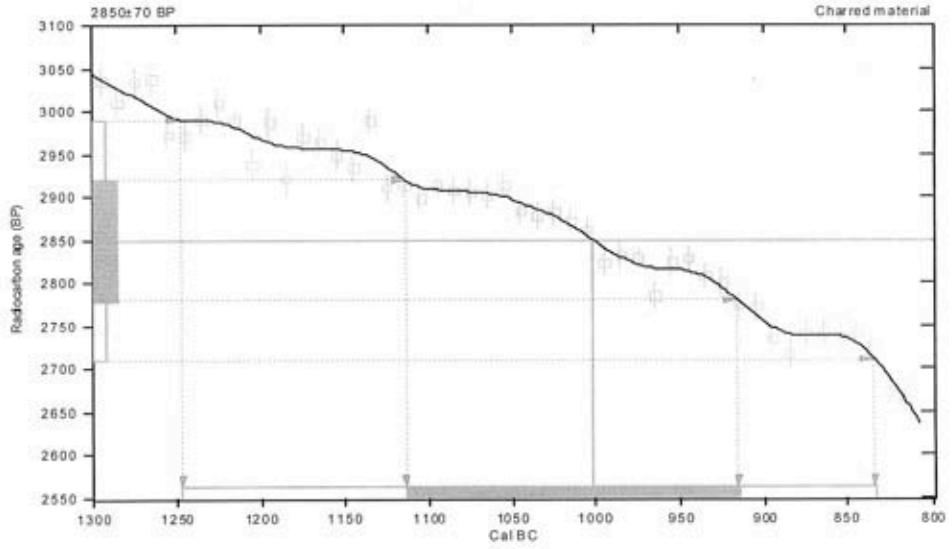
Conventional radiocarbon age: **2850±70 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 1250 to 830 (Cal BP 3200 to 2780)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1000 (Cal BP 2950)

1 Sigma calibrated result: (68% probability) Cal BC 1110 to 920 (Cal BP 3060 to 2870)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23:lab. mult=1)

Laboratory number: **Beta-209059**

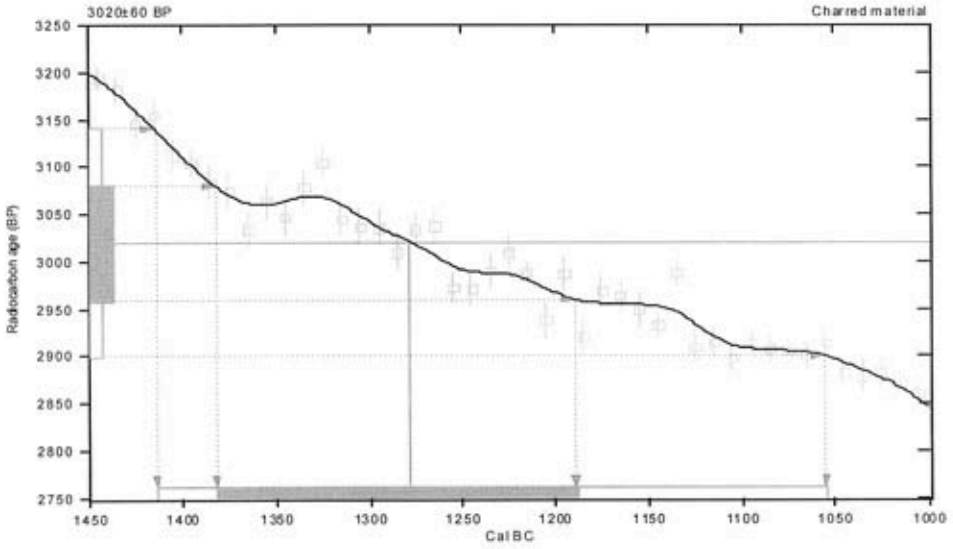
Conventional radiocarbon age: **3020±60 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 1410 to 1060 (Cal BP 3360 to 3000)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 1280 (Cal BP 3230)

1 Sigma calibrated result: (68% probability) Cal BC 1380 to 1190 (Cal BP 3330 to 3140)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-0.8:Delta-R=390±25:Glob res=-200 to 500:lab. mult=1)

Laboratory number: **Beta-209060**

Conventional radiocarbon age: **4380±70 BP**

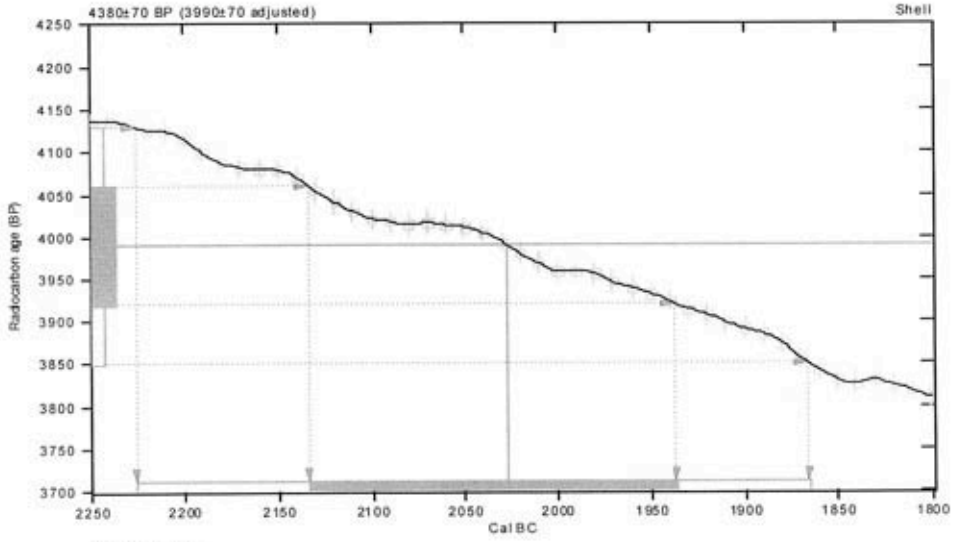
(3990±70 adjusted for local reservoir correction)

2 Sigma calibrated result: (95% probability) **Cal BC 2230 to 1870 (Cal BP 4180 to 3820)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 2030 (Cal BP 3980)

1 Sigma calibrated result: (68% probability) Cal BC 2130 to 1940 (Cal BP 4080 to 3890)



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